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Field Investigation Reports to Accompany
the M. A. Thesis, Culturally Accelerated
Sedimentation on the Middle Georgia Piedmont (U. of Ga, 1969)

In order to fully investigate the phenomena of accelerated sedimentation in the study area, approximately 80 full days were spent in field research. For current data, most of the Study Area was either personally checked by the investigator or the information was obtained from qualified observers such as Soil Conservation Agents or District Soil Scientists of the Soil Conservation Service.

Many of the landscape changes investigated are so recent and have evolved so rapidly that there can be little question either about their age or cause. In other cases, particularly certain swamps and wet areas such as Investigation Sites 17, 20, and 21, the changes have been very gradual, evolving over a period of a century or more, and conclusions concerning such sites are more open to question. There has been no stream morphology study, *per se*, of historic vintage in the Study Area. Consequently, records of peripheral observations, such as surveys, have of necessity been relied upon and the chance of error or omission must be considered in consulting these historic documents.[1]

The investigator has borne in mind that memories of local residents are also subject to error, especially considering that their observations were often random and there was little attempt on their part to establish accurate, scientific measurements. An attempt has been made by the investigator to corroborate such information, either by further interviews or by other documentation.

Equipment Used:

Sixteen Foot Sand Probe. The sand probe was the most useful tool utilized by the investigator. The penetration capability of the probe made it possible to measure the depth of sediment above harder strata such as bedrock, soft rock, or clay. In addition, the probe was a handy measuring device, especially across open spans and for vertical distances.

Soil Core Auger. The soil core auger had limited use because it was utilizable only in areas where the ground water level had dropped below the layer of sediments; use in areas with a high water level resulted in the collapse of the walls of the hole being bored with the result that the hole was filled as fast as the sediment material was removed.

In his investigations on the South Carolina Piedmont, Happ[2] found that much of the old alluvium had been scoured down to the subsoil before the modern sediments were deposited, an observation which was corroborated by this study. Because, in many cases, the modern sediments were deposited over rock or hard subsoil from which the old alluvium had been removed, the sand probe was almost as useful as the soil core auger in determining the depth of modern sediments. In any case, it was usually impossible to distinguish between modern sediments and old alluvial soils because the soils had become mottled while inundated.

Tree Increment Borer. This instrument had limited use because the bit was too fragile to penetrate large hardwood trees.

The Selection of Investigation Sites

In order to document the sedimentation processes, samples or Investigation Sites were chosen and are shown on Map 1.

The selection of these Investigation Sites was based on four criteria.

1. Significant sedimentation had to be evident.[3]

2. Some reference point or points upon which measurements through time could be made had to be present. These references or indices usually took the form of man-made objects such as dams or bridges. Older bridges were especially useful when plans were available.[4] Natural indices such as bedrock and other rocks were also helpful.

3. ~~Availability of~~ Other documentation concerning the site such as published material, surveys, and knowledgeable local residents had to be available.

4. It was desired that the total sample include all significant processes and phenomena of accelerated sedimentation.

Criterion No. 1 was fairly ubiquitous in the northern portion of the study area. Criteria No. 2 and No. 3 were the more critical. An attempt was made to sample all areas which had undergone significant sedimentation. However, the distribution of samples selected does not necessarily represent the distribution of sedimentation nor the intensity of sedimentation.

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[1]This is only a precautionary note and not a deprecation of the sources which were consulted. The original surveyors of the northern portion of the Study Area, for example, were given the following instructions: "In your field books, you are to note down . . . . all large lakes, swamps, ponds, and other remarkable objects touched, or crossed . . . ." (Manuscript copy of instructions given to the surveyors of the upper Oconee River Watershed, c. 1784, Office of the Surveyor General, Georgia Department of Archives and History, Atlanta.)

To insure that surveyors did submit accurate and complete plats, they were put under a bond of $10,000. (Interview with

Mrs. Pat Bryant, Deputy Surveyor General of Georgia, Office of the Surveyor General, Georgia Department of Archives and History, Atlanta, March 20, 1969.)

[2]Stafford C. Happ, "Sedimentation in South Carolina Piedmont Valleys," American Journal of Science, Vol. 243, No. 3, (March, 1945). pp. 116-117.

[3]Enough sedimentation to have modified the local landscape or to have caused damage.

[4]The author wishes to express his appreciation to Mr. Russell Chapman of the Georgia State Highway Department and to his assistants for their cooperation in securing the many bridge plans utilized.

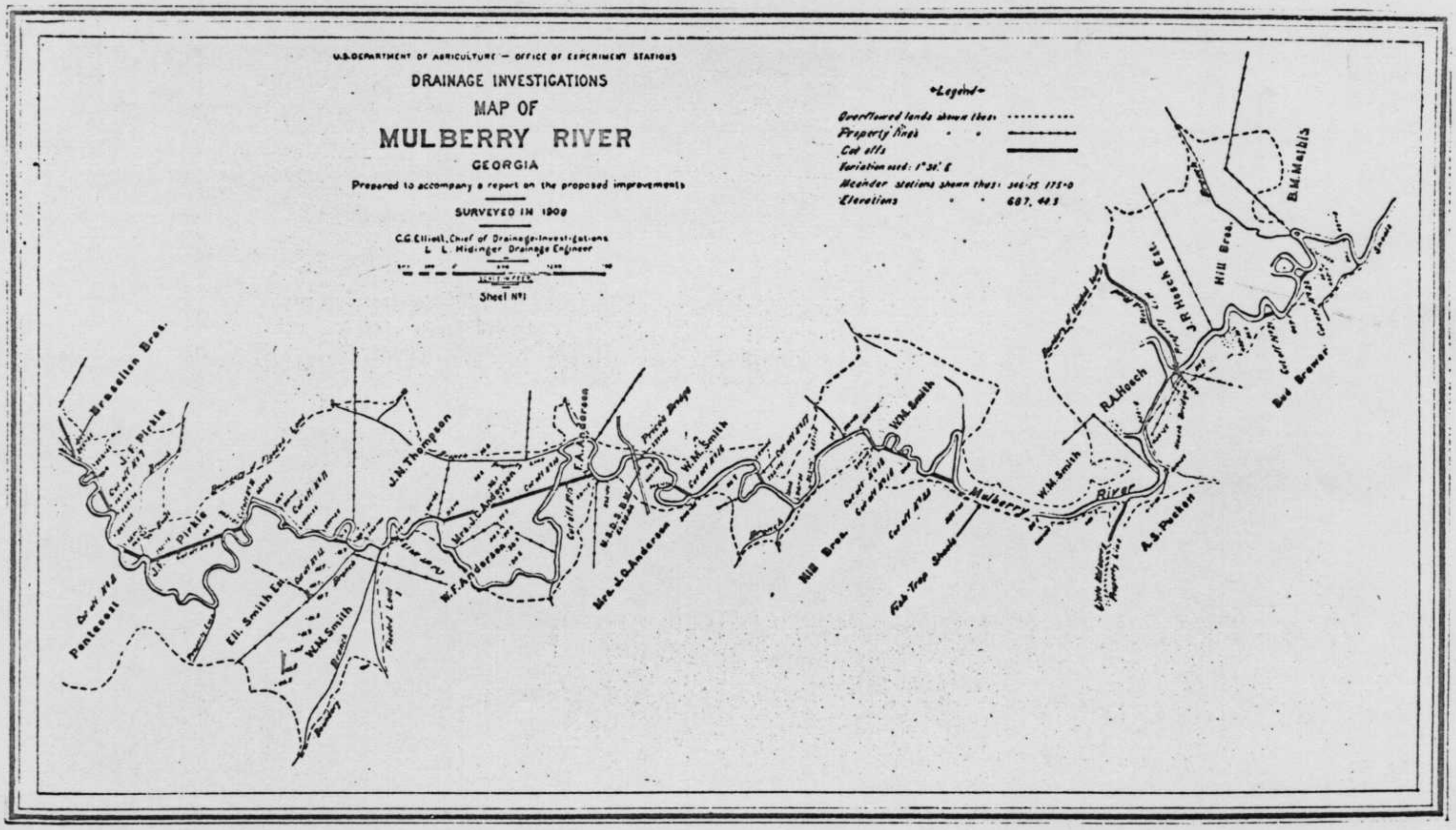
Mulberry River

The upper Mulberry River Watershed was one of the first in the study area to undergo pronounced accelerated sedimentation. Mauldin's Mill, Thompson's Mill, and Pirkle's Mill (Investigation Sites No. 1, No. 3, and No. 11) were all rendered inoperable by sedimentation before 1910. The problem had become so acute by 1908-09 that the U.S. Department of Agriculture ~~USDA~~ ran a survey on the upper river (from Thompson's Mill, Investigation Site No. 3 to Mathis Bridge, Investigation Site No. 5), and sediments in the channel at that time were from three to eight feet deep.[1] Deepening and straightening of the channel was recommended. Figure 1 is a map of the lower portion of the surveyed area. Note the recommended "cut offs."

In 1912-13, the river channel was deepened and straightened.[2] Both the old and the present (1964) channels are shown in Map 2. The improved channel filled soon after its improvement, probably because the lowered base level caused the degradation of upstream tributary sediments.

By the use of eleven Investigation Sites, this substudy will attempt to demonstrate that erosion-induced aggradation occurred in the entire Mulberry River Watershed until 1945-1950. Then, because of decreasing acreages of erosive crops and because of implemented conservation measures, erosion and consequent stream sediment load began to decrease~~d~~ in the upper Mulberry Watershed, circa 1945-55. The result was degradation such as noted in Investigation Sites 1, 2, 3, 4, 10, and 11. This degradation was later accelerated by sand removal at various locations along the upper river, and it is the investigator's opinion that this degradation, both vertical and lateral, is progressing at an increasing rate. The products of this

Map of Proposed Improvements on Mulbarry River, 1909.
Located on the Present Barrow-Jackson
County Line Between Investigation Sites 4 and 5

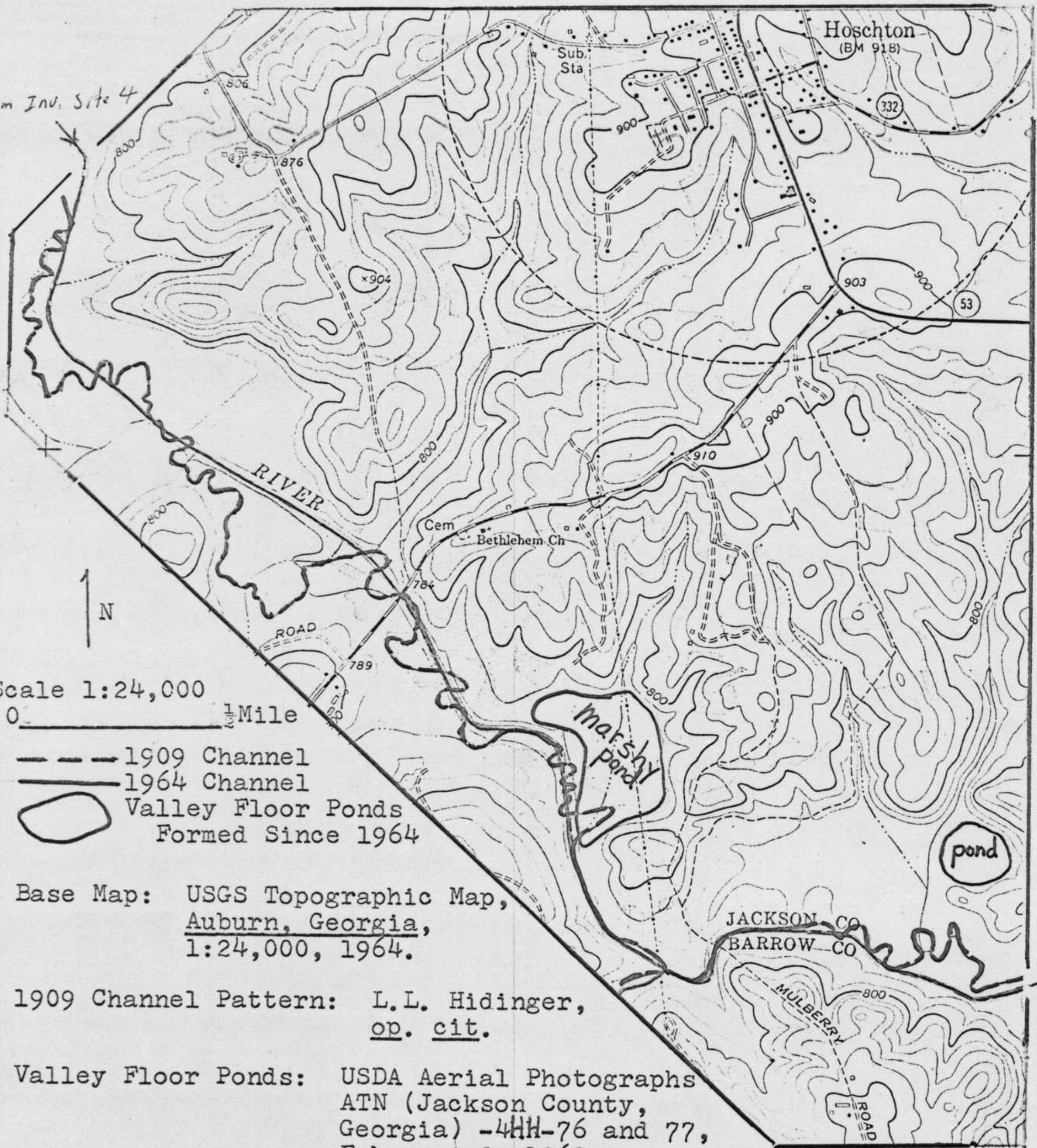


MAP OF LOWER PORTION OF MULBERRY RIVER, JACKSON COUNTY

Source: L.L. Hidinger, "The Improvement of Mulberry River, Jackson County" in S.W. McCallie and the U.S. Department of Agriculture, <u>A Preliminary Report on Drainage Reclaimation in Georgia,</u> Geological Survey of Georgia, Bul. #25, Foote and Davis, ~~Atlanta~~, 1911), ~~p. 93.~~ map opp. p. 92.
(Atlanta

Fig 1

Mulberry River Between Investigation Sites Four and Five
Showing the 1909 and the 1964 Channels and
Valley Floor Ponds Formed Since 1964



Scale 1:24,000
0 ½ Mile

1909 Channel
1964 Channel
Valley Floor Ponds Formed Since 1964

Base Map: USGS Topographic Map, Auburn, Georgia, 1:24,000, 1964.

1909 Channel Pattern: L.L. Hidinger, *op. cit.*

Valley Floor Ponds: USDA Aerial Photographs ATN (Jackson County, Georgia) -4HH-76 and 77, February 2, 1967.

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degradation both from the main stream and from tributaries, are accumulating downstream as shown at Investigation Sites 5 and 6, causing the water level to rise and the consequent swamping of adjoinging lowlands. The sediment is, in effect, migrating downstream. There is still 8 to 12 feet of sand in the degrading portion of the river which means that it is possible for downstream aggradation to continue for some time. Downstream low areas, ~~xxx~~ as yet unbothered by sedimentation, such as Investigation Sites 8 and 9, may yet be covered first by sediments, then inundated by the rising water level.

The Mulberry River was more extensively sampled than other streams for the following reasons:

1. The Mulberry River underwent and is yet undergoing extensive sedimentation and sedimentation damage.[3]

2. Many sites were present with excellent documentation available.

3. It was felt that at least one watershed should be given fairly comprehensive coverage in order to analyze spatial processes and variations.

[1] L. L. Hidinger, "The Improvement of Mulberry River, Jackson County" in S.W. McCallie and the U.S. Department of Agriculture, A Preliminary Report on Drainage Reclaimation in Georgia, Geological Survey of Georgia, Bul. #25, (Atlanta, Foote and Davis, ~~Atlanta~~, 1911), p. 93.

[2] Interview with Dr. Lloyd Lott, Hoschton, Georgia, April 26, 1969.

[3] It is the investigator's opinion that the Mulberry River suffered the most sedimentation and consequent sedimentation damage in the upper Oconee River Watershed.

Mauldin Mill Site, Mulberry River, Hall County, Georgia, <u>Investigation Site No. 1.</u>

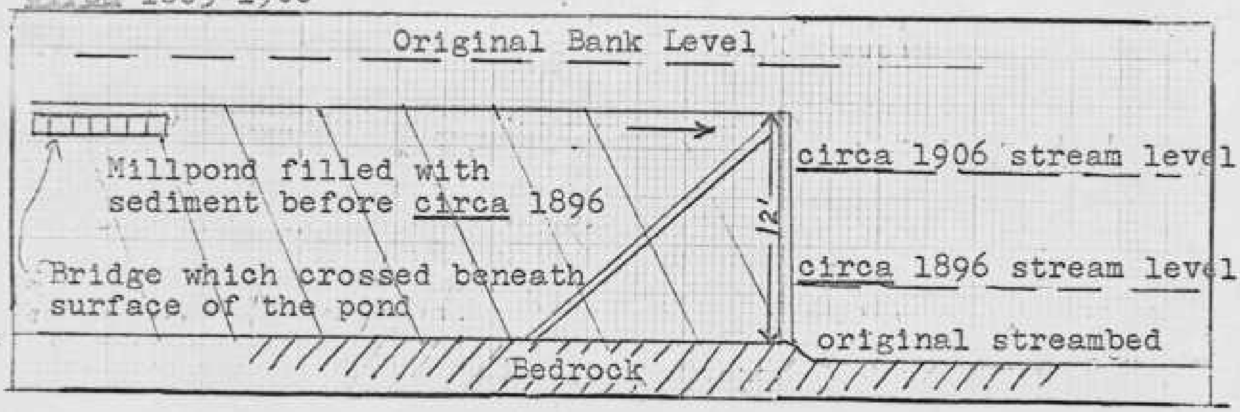
The dam, mill, and a bridge which crossed beneath the surface of the millpond were built *circa* 1865.[1] [9] The dam was built on bedrock and was 12 feet high. According to a ~~dated~~ deed, the dam was only 9 feet high by 1896.[2] [10] This indicates 3 feet of filling below the dam which, in turn, indicates that the mill pond had filled by that date. By 1906, there was so little head available (caused by filling of the creek downstream from the dam) that the turbines were no longer efficient and the mill was abandoned. A witness who saw the dam immediately after the mill was abandoned stated that there was only 3 feet of fall.[3] [11] At this time the banks were 2½ feet higher than the top of the dam and were essentially in their natural condition. By 1925-30, the stream bed ~~was at its highest level and~~ was approximately 4 feet above the top of the dam. The stream later started degrading itself and the dam reappeared 20-25 years ago. The stream bed immediately downstream from the dam is now approximately 3 feet below the level of the top of the dam. Downstream, there has been extensive removal of sand from the stream bed ~~downstream~~, and this accounts for much of the degradation.

[1] Most of the information for this Investigation Site was supplied by Mr. G. N. Sloan, Hall County, Georgia, January, 1969.
[2] Deed belonging to Mr. G. N. Sloan, Hall County, Georgia.
[3] Interview with Mr. Milt Tanner, Hall County, Georgia, November, 1968.

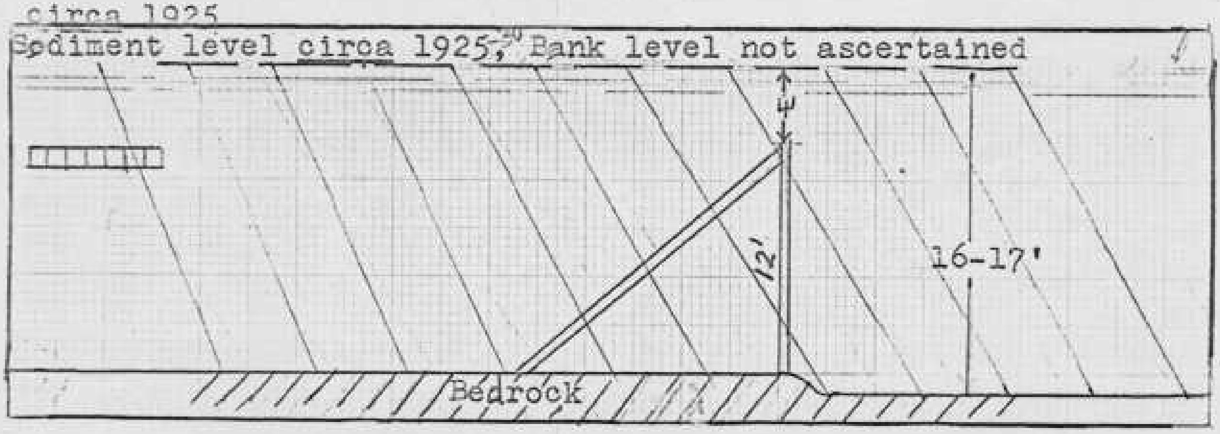
Mauldin's Millsite, Longitudinal Profiles, 1865-1969

Vertical Scale: 1" - 10'
No Horizontal Scale

circa 1865-1906



circa 1925



January, 1969

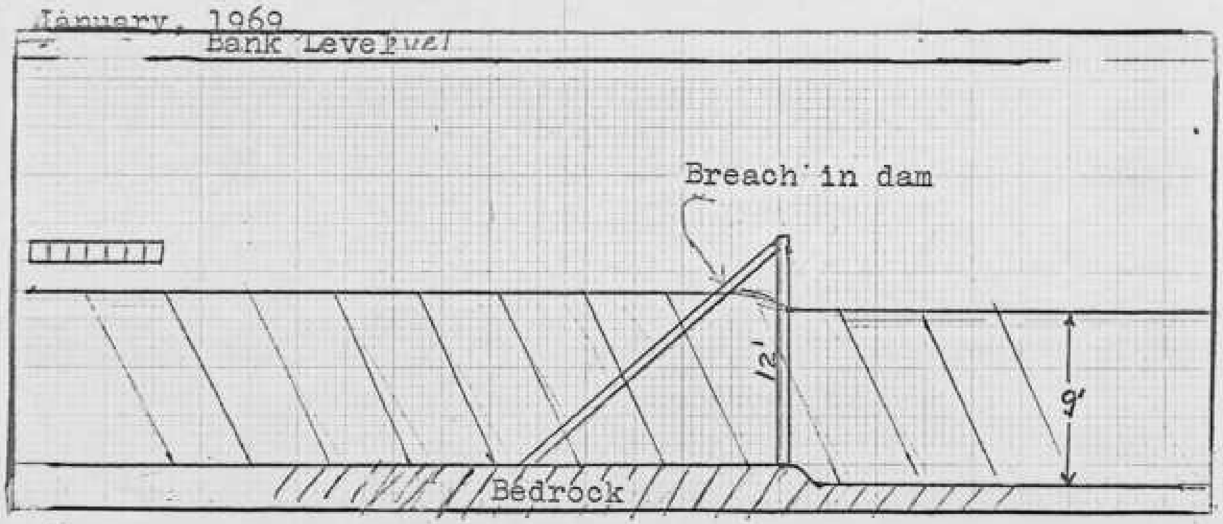


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Fig 2

Mauldin Millsite, Traverse Cross-Sections at Dam
Vertical Scale: 1" = 10'
No Horizontal Scale

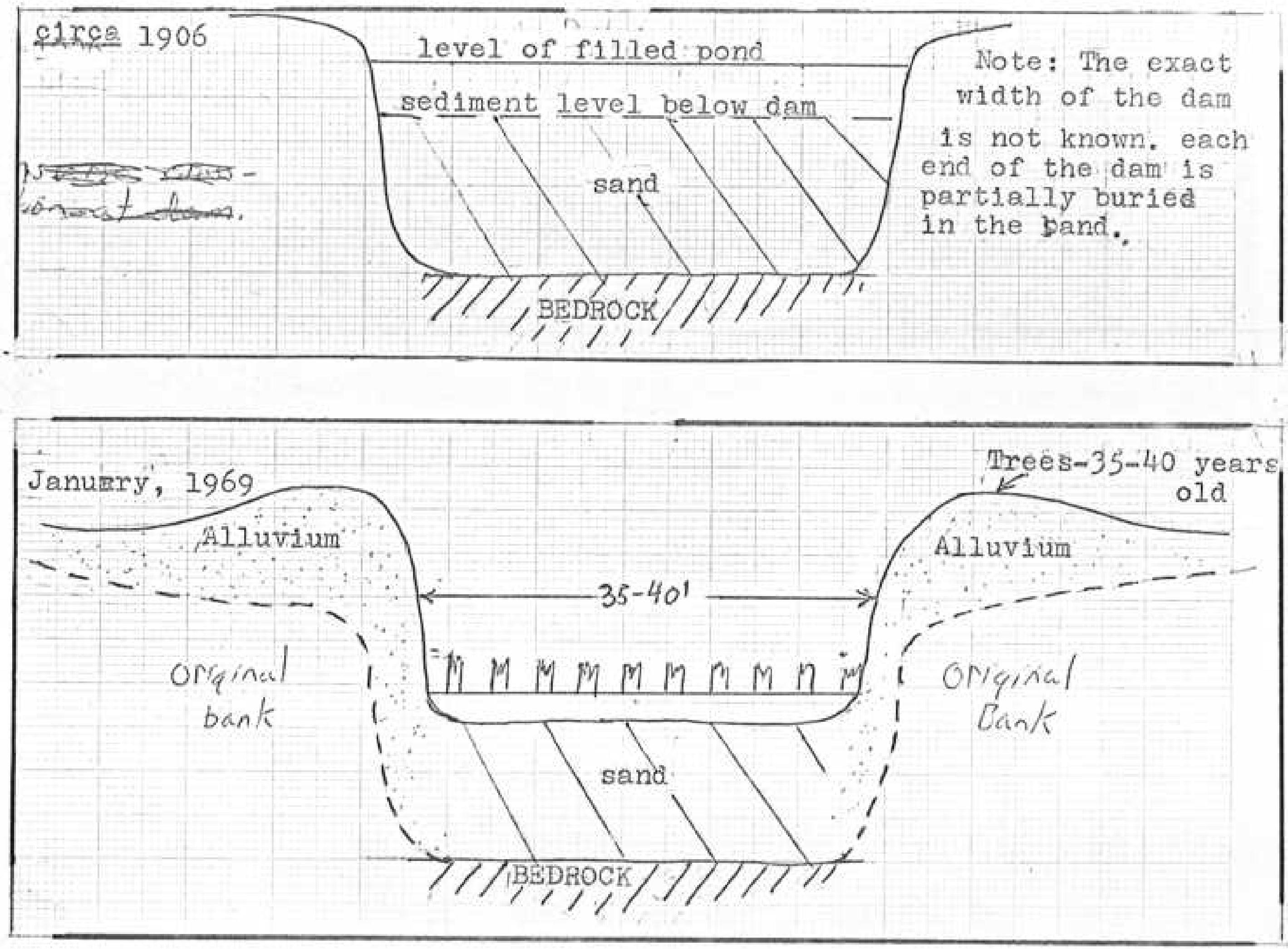

Fig 3

Mulberry River and State Highway 211, Hall County, Investigation Site No. 2.

The stream channel at this site probably began filling with sediment before 1900. This is assumed because Mauldin's Mill, (upstream, Investigation Site No. 1), and Thompson's Mill (downstream, Investigation Site No. 3) were both receiving great amounts of sediment by the turn of the century. The stream continued to aggrade and the 1938 stream level at Site 2 is shown in ~~the diagram~~ Fig. 4. The stream level reached its maximum level about 1944-1951. This level was ~~determined~~ estimated by use of aerial photographs and by interview of the land owner.[1]

Insert Fig 4

The valley floor filled with sediment, and swamps were formed on both sides of the stream above the bridge. The right bank swamp above the bridge was drained in 1945-46 by the use of ditches. This built-up land was seldom flooded and was used for pasture. The north bank swamp, formed after 1938, still exists even though the stream level is several feet below the level of the water in the swamp. The swamp does not drain because the natural levee acts as a dam. The river has been degrading for the last 12-15 years. This degradation process has been greatly accelerated by the removal of sand directly downstream from the bridge. Evidently, the increase in surface discharge after the removal of sand was enough to initiate the degradation.

Degradation has had serious effects at this site because the lateral cutting action of the stream is undermining the sandy alluvial banks, and the weight of the trees along the stream is causing large portions of the bank to slip into the stream. The right bank upstream from the bridge has had 10-20 feet removed in recent years, with 5-15 feet lost during spring, 1969.

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Large cracks, similar to earthquake fissures, have opened in the bank, and the next high water may cause several large pieces of the bank to slide into the river. Large trees which have fallen into the water as a result of this process may tend to retard further degradation.

Transverse Profile at Bridge:

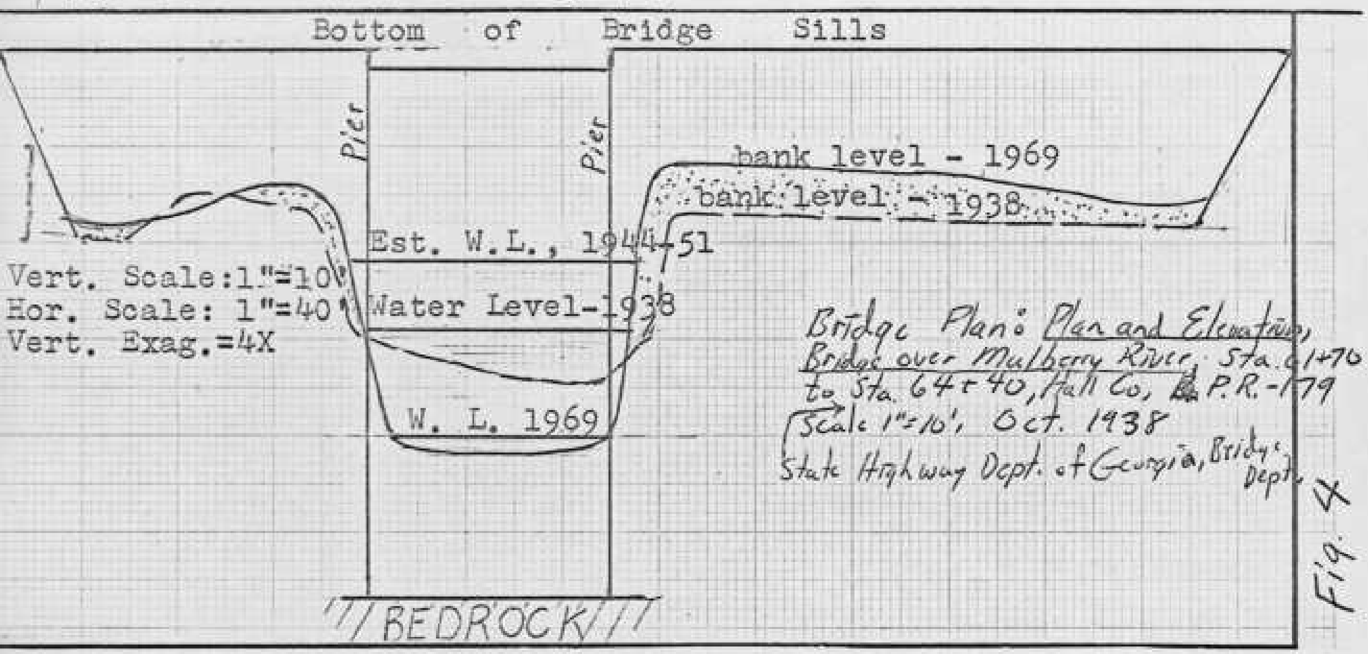

Fig. 4

[1]Interview with Mr. Vana Harris, Hall County, Georgia, April 26, 1969. Aerial Photographs utilized: USDA ATL (Hall County, Georgia) -2C-15 and 16; March 5, 1944, ATL-9H-131 and 132, May 7, 1951, ATL-5HH-107 and 108, March 1, 1967.

Investigation Site 3, Thompson Millsite, Mulberry River, Barrow-Jackson County, Georgia.

The mill and dam were built shortly after the Civil War. By circa 1910, the stream and millpond had so filled with sediment that the mill became inoperable by water power. It may be therefore assumed that the millpond had filled and that the stream below the dam had filled to within two to three feet of the pond level, as was the case at Mauldin's Mill, Investigation Site 1. The banks at that time were approximately level with the top of the dam. The dam was completely covered by sediment during the 1930's and 40's to the approximate level shown in Fig. 5. During this period, the river flooded often, forming the natural levees. The streambed has been degrading itself since the late 1940's and has been accelerated by the removal of sand downstream. A heavy rainfall in January, 1969, resulted in an additional six inches of degradation. There is undermining of the banks downstream, and large portions of the bank along with trees are slipping into the river and causing blocking of the channel.

[1]The information for this Investigation Site was given by Mr. G.N. Sloan, Hall County, Georgia, and Mr. Perry Maddux, Barrow County, Georgia, November and December, 1968.

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Thompson Millsite, Longitudinal and Transverse Profiles
Vertical Scale: 1" = 10', no Horizontal Scale

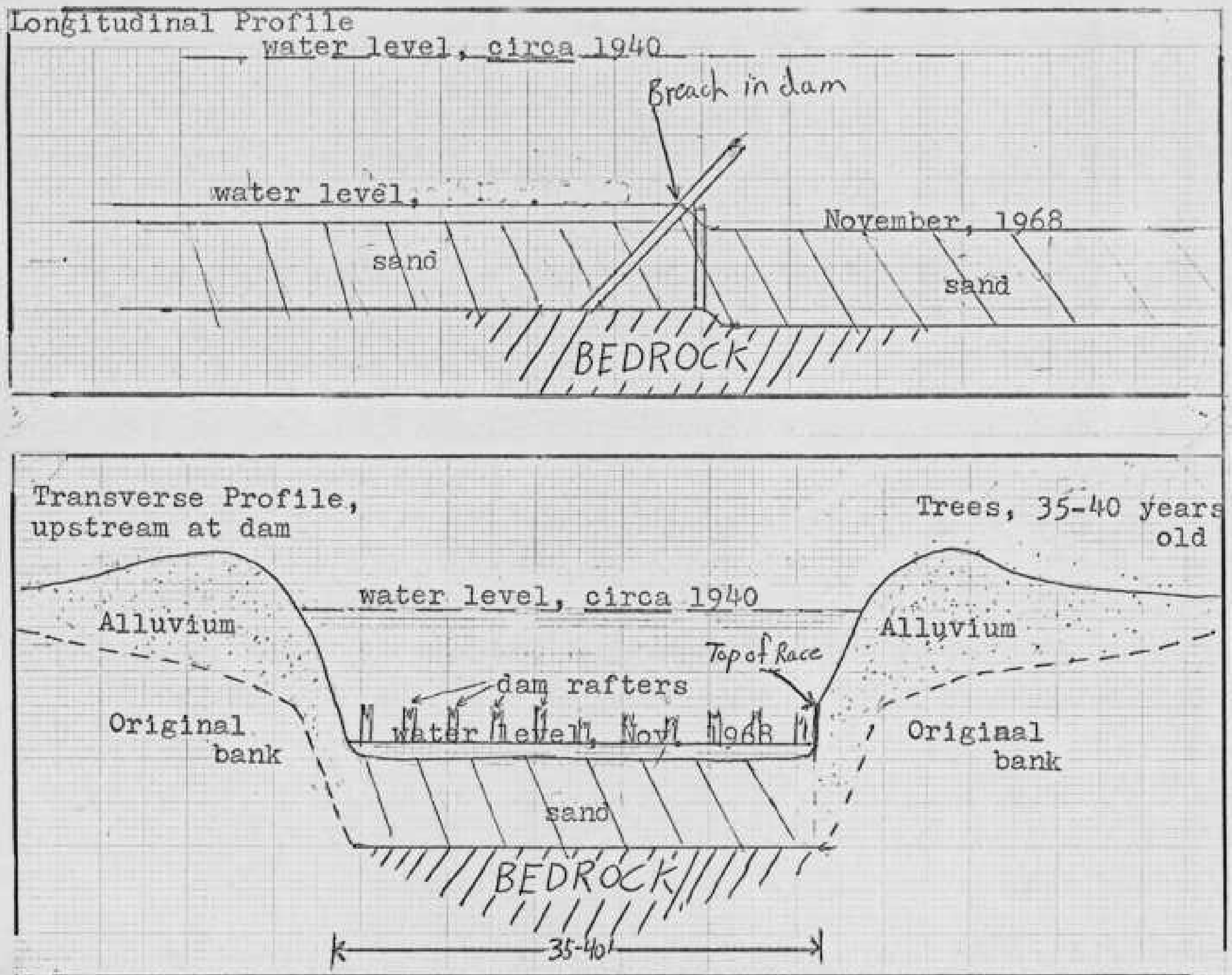


Fig 5

Mulberry River, Highway 124, Barrow-Jackson Counties, Investigation Site No. 4.

Although this site was not specifically mentioned, this section of the Mulberry River had from three to eight feet of sand over bedrock in 1909.[1] By 1949, as shown in ~~the diagram~~ Fig 6, the water level was eighteen feet above bedrock. The removal of sand at this site has caused degradation as at Investigation Site No. 2, and the water level has been lowered six feet.

Transverse Profile at Bridge

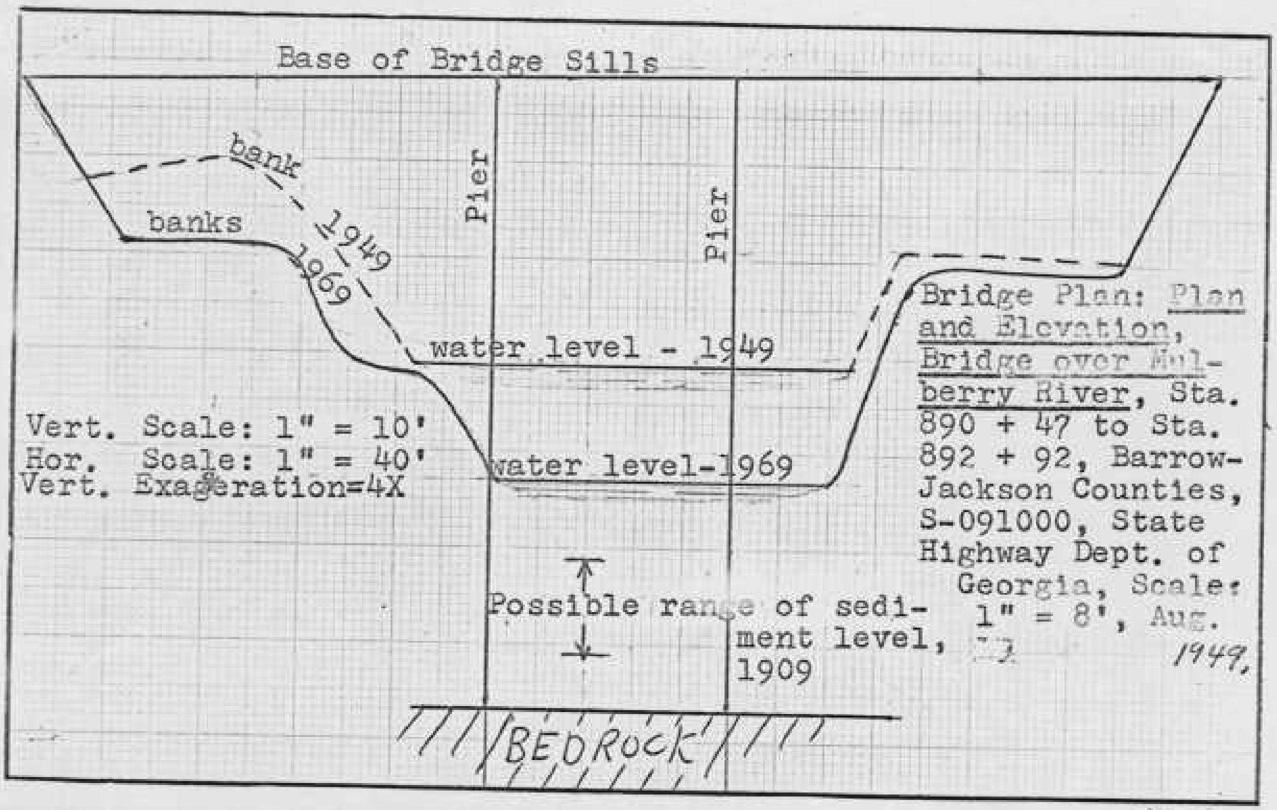


Fig. 6

[1]L.L. Hidinger, "The Improvement of Mulberry River, Jackson County," in: S.W. McCallie and the U.S. Department of Agriculture, A Preliminary Report on Drainage Reclaimation in Georgia, Geological Survey of Georgia, Bulletin #24, Foote and Davis, ~~Atlanta,~~ Atlanta 1911, p. 93.

Mathis Bridge and Mulberry River, Barrow-Jackson Counties, Investigation Site No. 5 .

Mathis Bridge crossed Mulberry River at the head of a bedrock shoal which extended one-half mile downstream. In 1909, although the river upstream had channel sediment of from three to eight feet, these shoals had not been covered because "there was a velocity sufficient to sweep all the sand off this rock and carry it over the rapids."[1] These shoals remained visible until circa 1935 when they were covered by sediment.[2]

The shoals are presently (April, 1969) covered by seven feet of sand. The banks at this point have been built up considerably by overflow sediment, and much of the east end of the bridge is buried by sediment.

There are several new ponds being formed upstream from ~~Gunnin Lake.~~ Mathis Bridge.[3] ~~10~~ Two newly-formed ponds were identified on 1967 aerial photographs and are noted on Map. 2. These areas appeared as forest or as shrub-like growth in 1955.

[1]L.L. Hidinger, "The Improvement of Mulberry River, Jackson County" in S. W. McCallie and the U.S. Department of Agriculture, A Preliminary Report on Drainage Reclaimation in Georgia, Geological Survey of Georgia, Bul. #25, (Atlanta: Foote and Davis, ~~Atlanta,~~ 1911), p. 93.

[2]Interview with Mr. Glenn Hill, Jackson County, March 23, 1969.

[3] ~~10~~The investigator was informed of these ponds by Mr. Glenn Hill, 23 March, 1969. The growth of these lakes was checked by aerial photography. Photographs used were: USDA, ATD (Barrow County, Georgia) -1P-78 and 105: November 17, 1955, and ATN (Jackson County, Georgia) -4HH-76 and 77: February 2, 1967.

State Highway 53 and Mulberry River, Barrow-Jackson Counties.
Investigation Site No. 6. ~~Note: All major landscape features discussed at this site are found on Map 3.~~

As shown in ~~diagram 1~~ Fig 7, the streambed at the bridge has aggraded 8½ feet since 1934 and approximately twelve to thirteen feet since 1902. The area of opening under the bridge has been reduced to a fraction of the original, and high water often overflows the bridge.

~~Diagram 1.~~ Transverse Stream Profile at Bridge.

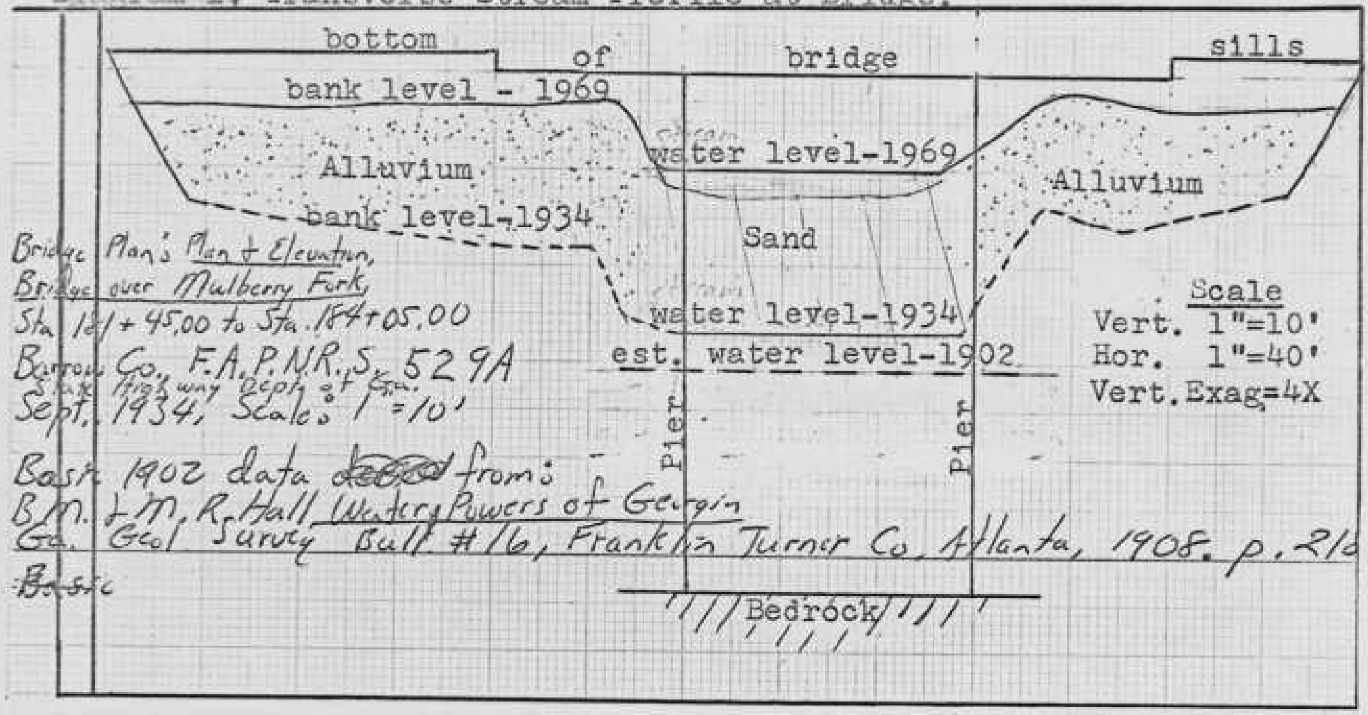


Fig 7

The river in the site area is still aggrading as will be shown later in the discussion ~~on Gunnin Lake~~. The sediment material appears to be coming from the upstream degradation discussed in Investigation Sites 1, 2, 3, and 4. The city of Winder, Georgia, in 1966 built a dam and reservoir one mile downstream from the Highway 53 bridge. This dam, shown on Map 3, is probably increasing sedimentation by raising the base level. The banks at the bridge site were built up with from one to four feet of sand after the heavy January, 1969, rainfall. Unfortunately, the stream level was not checked before this rainstorm, and channel aggradation as a result of this high stream discharge, if any, cannot be ascertained.

The local residents who have known this area for a long time ~~insist~~ state that the surface stream discharge at the bridge is much less than 40 to 50 years ago.[1] Part of this reduction of surface flow may be attributed to the subsurface discharge through the channel sediments. This phenomena is of importance at this site because

~~Thisxphenomenaxisxofximportancexatxthisxsitexbecausexthis~~

the possible decrease in surface discharge and resultant decrease in stream competence may also be a contributing factor to the sedimentation presently occuring.

Approximately .2 mile downstream from the bridge was a bedrock shoals which was visible until 1930.[2] This shoals is now (March 23, 1969) buried by 17 feet of sand as shown in Fig. 8.

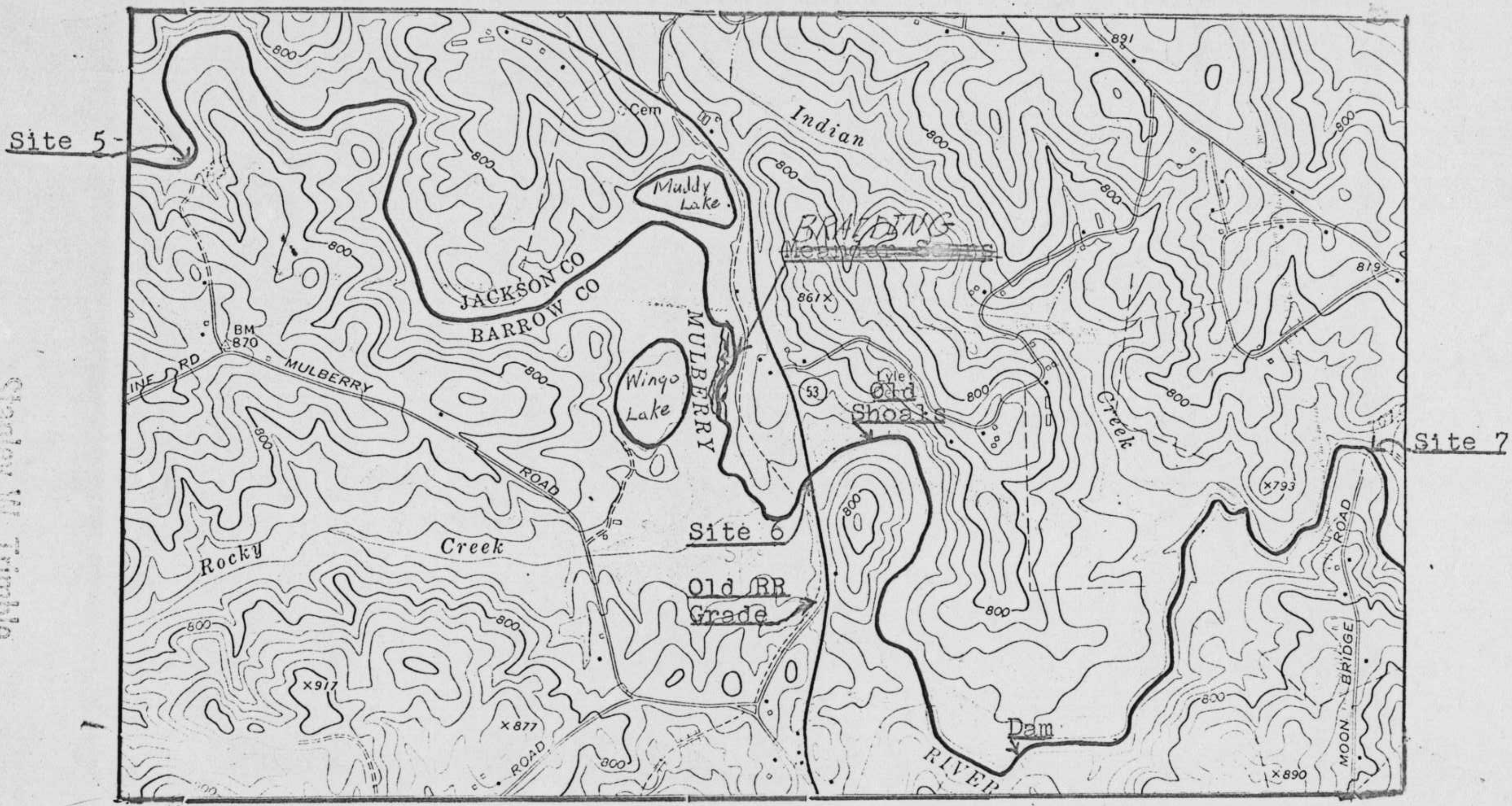
Approximately ½ mile upstream on the left bank, the river spilled over onto the valley floor during high water, circa 1920, and created a small pond which became larger each year except 1925, a drought year. This pond is now known as Muddy Lake or Gunnin Lake and is shown on Map 3. It covered 15 to 16 acres in 1944 and had expanded to 18 to 19 acres by 1967.[3] According to local fishermen, the lake is 8 feet deep.

Investigation Sites Five, Six, and Seven
with Details at Site Six

Scale 1:24,000

0 ½ 1 mile

N

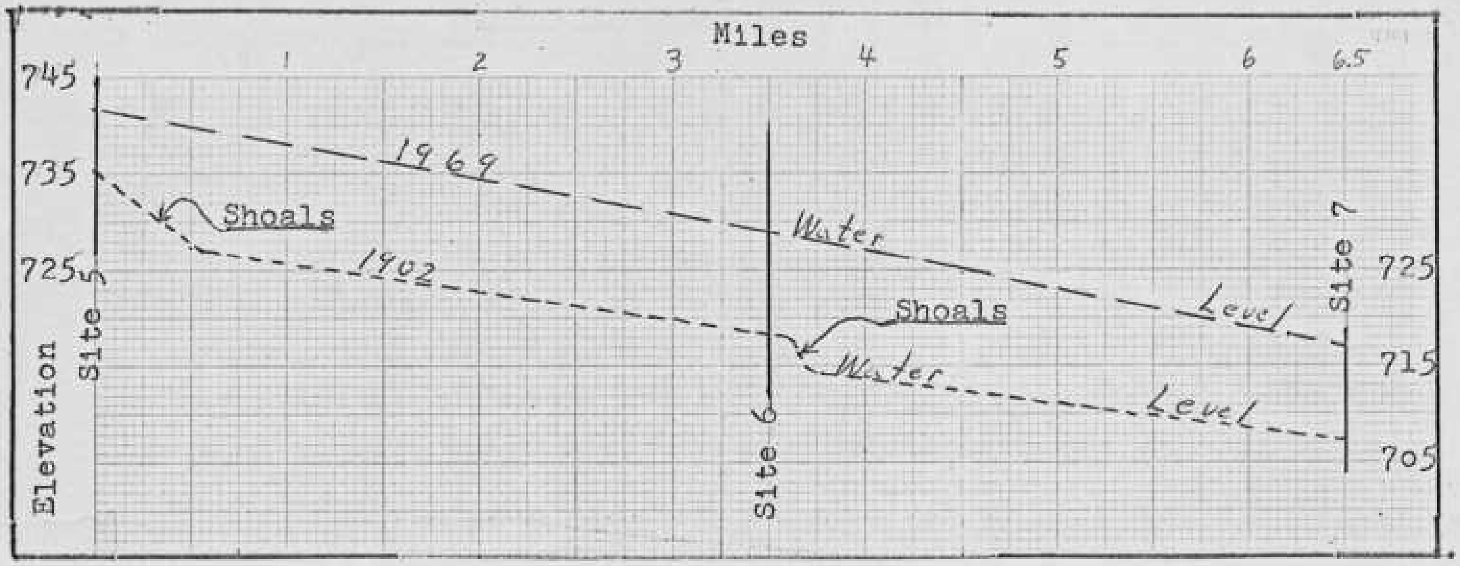


Base Map: USGS Topographic Map Winder North, Georgia , 1:24,000, 1964

Map 3

Longitudinal Profile on the Mulberry River from Investigation Site Five

to Site Seven with 1902 and 1969 Stream Levels Shown



Vertical Scale: 1" = 20'

Horizontal Scale: 1" = 1 mile

All Sea Level Data Based on the 1902 Survey

1902 Survey by J.B. High in B.M. and M.R. Hall, Water Powers of Georgia, Georgia Geological Bulletin #16, Franklin-Turner Co., Atlanta, 1908, p. 218.

Fig. 8

There is an inlet from the river at the head of the lake and an outlet to the river at the lower end of the lake. The level of the lake is thereby governed by stream level. According to aerial photography and to local fishermen, the level of the lake is still rising, ~~which~~ indicating that the river is still aggrading. It is the investigator's opinion, as previously ~~mentioned~~ stated, that the channel sediment material, which is pure sand, is a result of the degradation action taking place on the upper Mulberry River watershed.

The valley floor over which the pond is formed was a corn field as late as 1918.[4] The Jackson County Soil Survey, completed in 1914, lists this valley floor as Congaree silty clay loam which is described thusly:

> "This type is very productive, but is not utilized to any great extent on account of its poor drainage. The flat bottoms are overflowed with heavy precipitation. . . . This soil in the early stages of development of the county formed the chief farming areas, but with the removal of the forests the land overflowed more often and in many places the bottom land was ruined by the deposition of sand, the fields being abandoned or used for pasture. (emphasis the investigator's) The type can be reclaimed by the deepening of the stream channels, the construction of deep ditches, and the building of levees."[5]

This type of soil has a developed profile which means that the water table had always been at least 30 to 36 inches below the surface. Thus, considering the depth of the lake, it becomes clear, as is shown in Fig. 2, that the Mulberry River has aggraded itself at least 11 feet at this point with at least eight feet having been added since 1918. Ten to twelve feet of aggradation is the estimate given by knowledgeable local citizens. This estimate compares favorably with the aggradation since 1902 at the Highway 53 bridge as shown in ~~Diagram 1~~ Fig 7. A local informant also stated that the river changed course somewhat during the early aggradation process, and at least one oxbow lake was formed.[6] Aerial photography did not reveal an oxbow lake, but there are apparent meander scars adjacent to Wingo Lake, which are shown on Map 2.

Wingo Lake in Barrow County, as shown on Map 2, was formed under similar circumstances to Gunnin Lake. Its area was only 12 to 13 acres in 1944, but it had expanded to 24 - 25 acres by 1967.

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[1]Interview with Mrs. Alec Hill and Mrs. Allie Stewart, Jackson County, Georgia, March 23, 1969. This phenomenon as connected with silted streams has been mentioned by many other interview sources in the course of this study. Hidingerr states that this section of the Mulberry River was in 1909 "about 50 or 60 feet wide and eight to ten feet deep." (L.L. Hidinger, op cit, p. 93). The present channel, as shown in Diagram 1, is 60 feet wide and two to three feet deep.

[2]Interview with Mr. Glenn Hill, Jackson County, Georgia, March 23, 1969.

[3]USDA Aerial Photographs: ATN (Jackson County, Georgia) 4C-129 and ATN-3C-37: May 8, 1944, and ATN-4HH-47 and 48: November 17, 1955.

[4]Mrs. Allie Stewart, March 23, 1969.

[5]Mark Baldwin and David D. Long, Soil Survey of Jackson County, Georgia, USDA, Bureau of Soils, (Washington: Government Printing Office, 1915), p. 24.

[6]Mr. Glenn Hill, March 23, 1969.

[7]USDA Aerial Photographs, op.cit.

[8]Ibid.

Mulberry River at Moon Bridge, Barrow-Jackson Counties, <u>Investigation Site No. 7.</u>

The sills of this bridge were ten to eleven feet above the surface of the water in 1926, but aggradation had brought the water level almost to the sills in recent years.[1] Sand removal was begun at this site in Autumn, 1968, and the amount removed per week has averaged 700-800 tons.[2] As a result of this sand removal, the stream level has dropped to approximately two feet below the sills of the bridge at normal flow. Natural levees have built up through the years on both sides of the stream, and the south end of the bridge is partially buried by sand.

[1]Interview with Mr. Harvey Watkins, Jackson County, Georgia, March 22, 1969. Note: If Mr. Watkins' memory is correct, the river would have had to flow on bedrock at that time because bedrock is 11½ feet below the sills of the bridge. Mr. Green Page, Barrow County, Georgia, stated on April 26, 1969, that he felt that 10-11 feet was too high an estimate.

[2]Mr. Green Page, 26 April, 1969. The volume of sand removed would then be approximately 640-730 cubic yards per week.

Investigation Site 8, State Highway 11 and Mulberry River, Barrow-Jackson Counties.

There has been only three feet of aggradation at this point since 1930, as shown in Fig. 9. Judging from the recent deposits of sand along the natural levees, much of the channel aggradation may also be recent. The present owner of the site stated, however, that there has been no noticeable aggradation in the past fourteen years that he has owned the land.[1] It is the investigator's opinion that the large accumulation of sediment, now situated upstream from the Highway 53 bridge to below the old Moon Bridge, will continue to move downstream. The valley floor on the right bank at this site is now a rich pasture. As shown in ~~the Diagram~~ Fig 9, if the river channel aggrades only two more feet, much of the adjoining valley floor will be inundated. Should this happen, the land will probably be abandoned to become swamp as has happened upstream.

[1]Interview with Mr. Blain Shepley, Barrow County, Georgia, April 26, 1969.

Investigation Site 9, Hancock's Bridge, Mulberry River, Barrow-Jackson Counties.

In 1902, there was twelve feet difference in elevation between the water surface and the top of the downstream, right bank bridge pier.[1] This difference was checked again on April 26, 1969, while the river was at normal flow, and there was only six feet three inches difference. Thus, the river has aggraded nearly six feet at this site since 1902.

[1]B.M. and M.R. Hall, Water Powers of Georgia, Georgia Geological Survey Bulletin No. 16, (Atlanta: Franklin Turner Co., 1908), p. 218.

Mulberry River at the U.S. Highway 11 Bridge

Transverse Stream Profile

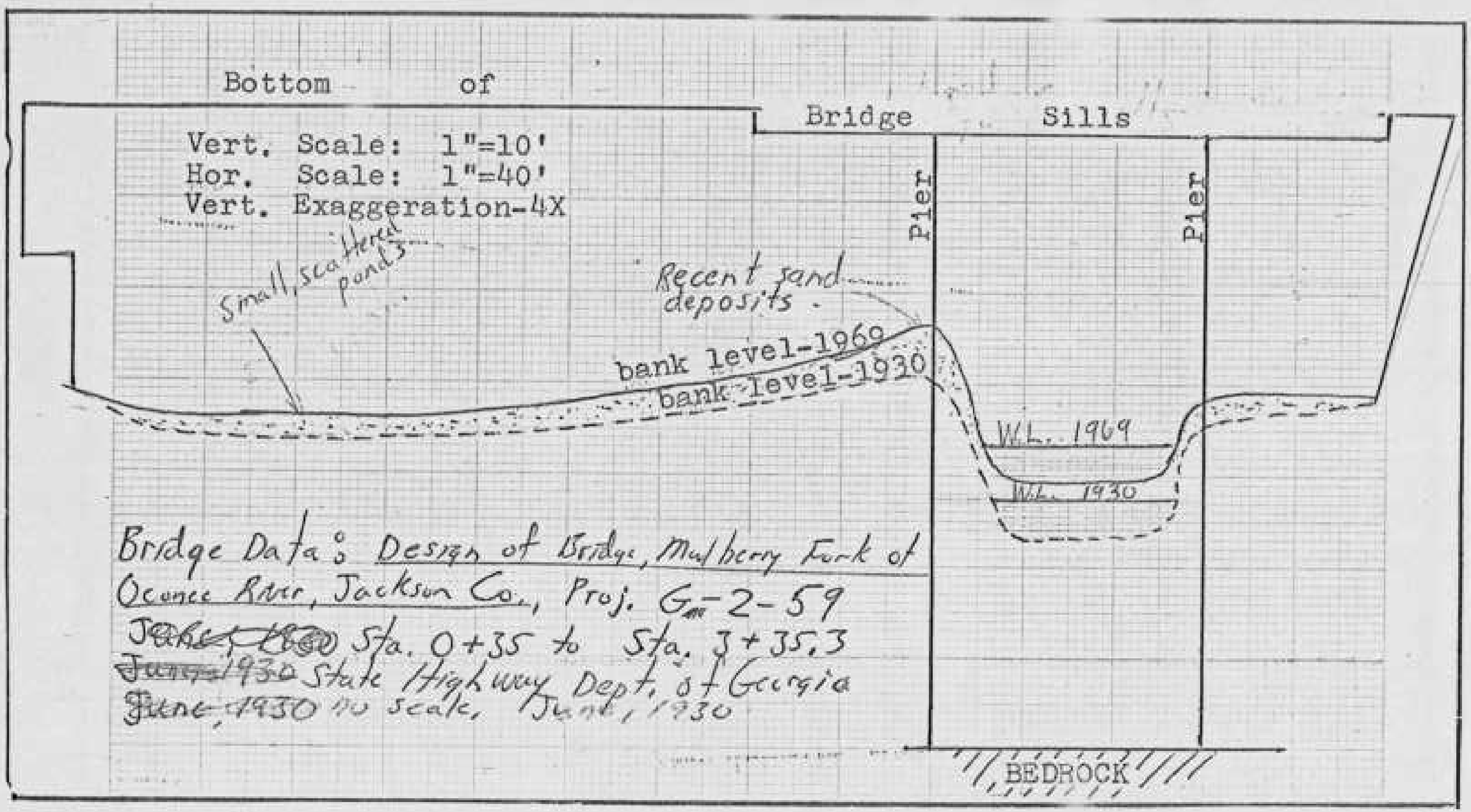

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Fig 7

<u>Investigation Site 10</u>, Flanagan Millsite, Flanagan Creek, Jackson County.

The 18-foot stone dam was built to replace an older, lower wooden dam in 1915. As shown in Fig. 10, the mill was approximately ½ mile downstream from the dam. The creek flowed on bedrock past the mill as late as 1918.[1] The pond, however, had already begun to fill with sediment by 1918, and the upstream end was filled by the early 20's. Cattails and brush growing in the upstream end helped speed the deposition. The pond was often drained during this era, but to no avail; by 1932-33, the pond was completely filled except for a small pool above the dam.

Meanwhile, the creek was filling below the dam. There was a bridge, shown in Fig. 11, located halfway between the dam and the mill, which was suspended eight feet above the bedrock. By 1925-27, the sand had built up to the bridge. The mill, further downstream, had been built high enough so that a wagon might be driven under the mill in 1915-1918. By 1934-35, the valley floor had filled up with sand to the level of the ~~sand~~ sills of the mill. Earlier, in 1920-22, the diameter of the overshot wheel had been reduced four feet ~~[illegible]~~ to place it above the level of the sand. The sand soon reached the level of the new wheel and by 1932-33, had completely put the mill out of business.

The dam was burst to drain the pond in 1935-36, but this only succeeded in permitting the creek to incise itself into the then completely filled mill pond. This filled area, now in pasture, is nine to ten acres and the creek has cut a trench up to 14 feet deep and 75 feet wide. A heavy rain and consequent stream discharge in January, 1969, ~~having~~ enlarged the trench from five to twenty feet in width. The estimated volume of the fill is 150,000 cubic yards.

The level of the streambed downstream from the dam remained static from the mid-30's until recently. In the past five or six years, the stream has degraded itself four to five feet. The present longitudinal stream profile is shown in Fig. 10.

[1] Interview with Mr. Otis Gooch, Jackson County, Georgia, November, 1968.

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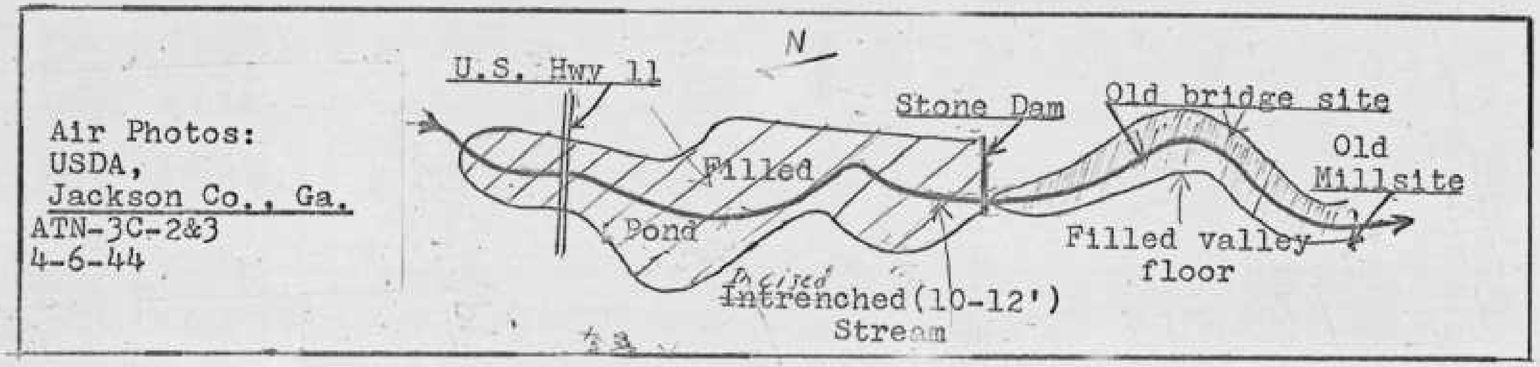
Geog. Dept., U. of Ga.

Flanagan Millsite

Sketch pâan of the filled pond and ~~x~~ of the stream beluw the dam.
(Drawn ~~(Made~~ from air photos and field observation) Scale: app. 1:7,000.



Longitudinal Profile, January, 1969.

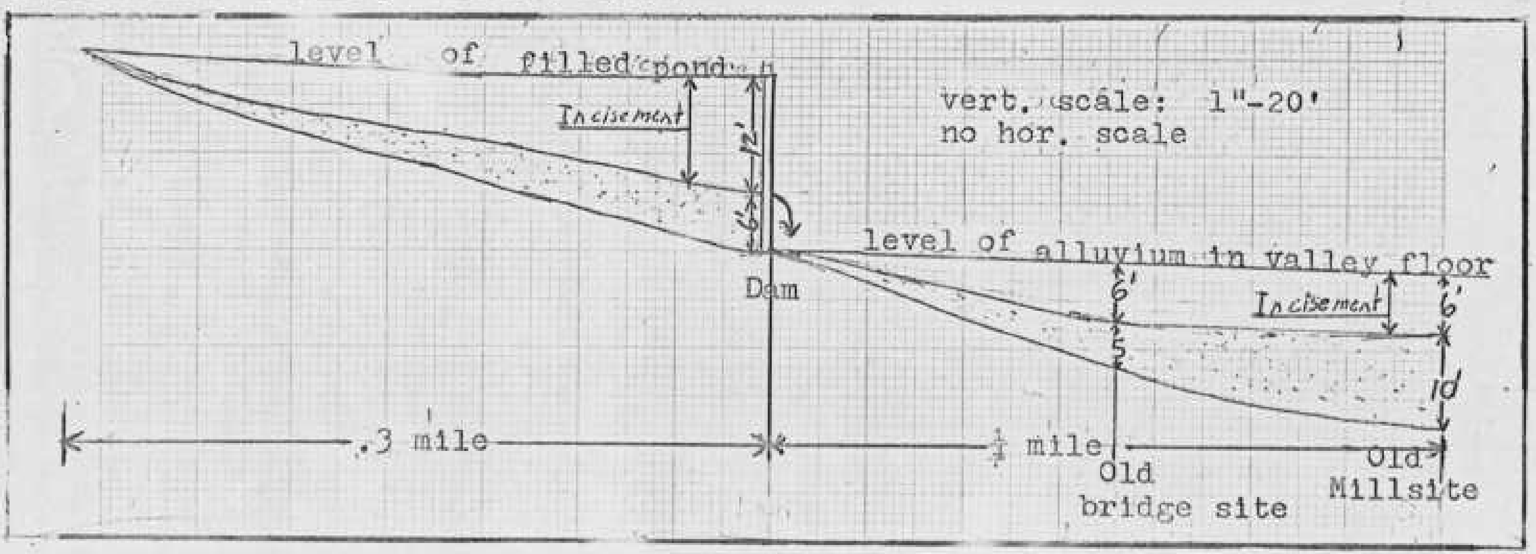


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Fig 10

Flanagan Millsite

Transverse Profiles at Old Bridge Site
Vertical Scale: 1"=10'
No Horizontal Scale

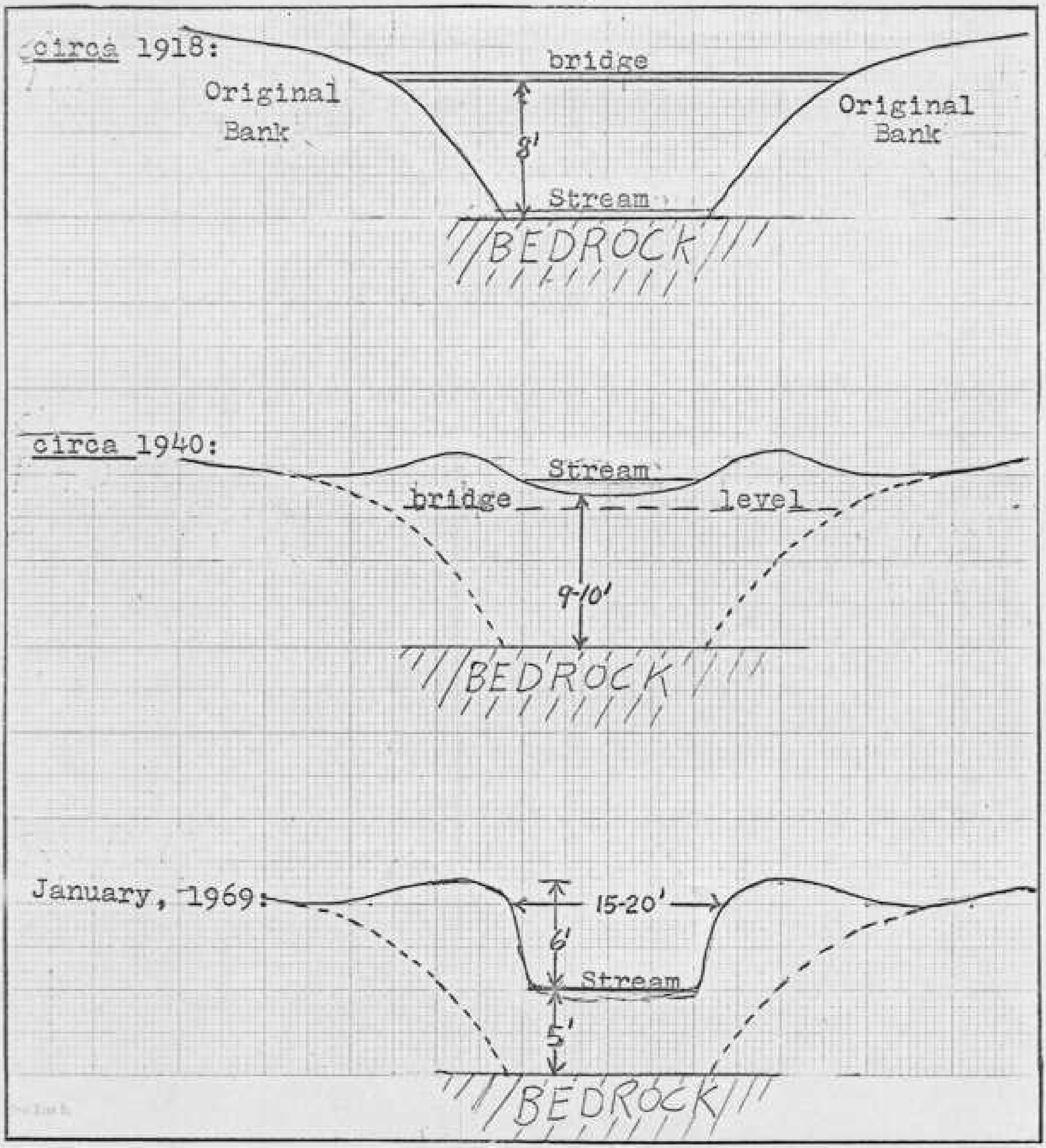

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Fig. 11

Pirkle's Mill site, Little Mulberry River, State Highway 211, Barrow County, Investigation Site No. 11 .

This millpond began filling before the turn of the century. By 1905-10, the millpond had completely filled and the stream below the dam had filled high enough so that the turbine was no longer useful.[1] By 1915, The dam was ~~later~~ completely covered by sediments and remained covered until recently.[2] The streambed level before 1941 has not been ascertained, but evidently was not significantly above the level shown in Fig 12 for 1941-1948 when the level was known to be static. The stream began degrading at this site circa 1948, and the milldam has only recently been uncovered. A single heavy rainfall and consequent high stream discharge in January, 1969, caused the streambed to degrade approximately six inches. Several inches were also removed from the right bank. According to the Barrow County Soil Conservation Agent, Mr. Sam Dunaway, the entire stream with the exception of the last one-half mile is degrading. The sediment materials are entering the Mulberry River upstream from site 5.

Longitudinal Profile:

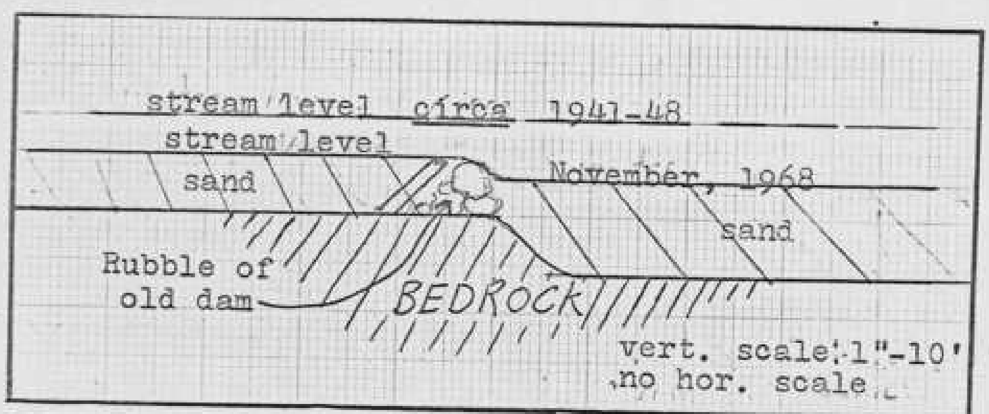

Fig 12

[1]Interview with Mr. Prince Pirkle, Jackson County, Georgia, February, 1969.

2. Interview with Mr. C. A. Hardy, & Mr. Albert Carter Jackson County, Georgia, January 1969.

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Middle Oconee River

The upper Middle Oconee River watershed also underwent extensive sedimentation. Many tributaries and the upper portion of the main stream were deepened (trenched) and straightened by landowners in a vain attempt to relieve the problem. Most tributaries in this watershed which have been trenched are on the USGS topographic sheet <u>Pendergrass, Georgia</u> (1:24,000) and may be easily noted by their anomalously straight channels.

Many of the upstream tributaries (such as Walnut Creek, Investigation Site No. 13) are now degrading because of changes in land use and improved conservation practices. These reentrained sediments are moving downstream where aggradation is now taking place. The downstream movement of sand as stream sediment bedload is indicated by splays of sand along the banks of the lower Middle Oconee River, particularly between Investigation Site No. 12 and Athens. The increasing rate of this process is evidenced by the much more pronounced ubiquity and size of overbank sand splays formed during the winter of 1968-69 than in previous years even though maximum stream discharge figures had been as high in some previous years.[1] Reentrained sediments from this stream combined with those of Mulberry River may have serious future consequences for downstream bottom lands.

---

[1]An example of this overbank deposition can be seen along the Middle Oconee River between Whitehall and Watkinsville, Georgia. The deposits, located on the right bank downstream from the bridge, are from two to four feet thick, of pure sand, and are located along the stream, forming natural levees. An examination along the bank revealed very little previous overbank sedimentation at this location.

A possible explanation for this deposition is the fact that Barber Creek, which enters the river a short distance upstream from the west, is undergoing rapid degradation. According to Mr. E. L. McLaughlin, Barrow County farmer, and Mr. Sam Dunaway, Barrow County Soil Conservation Agent, Barber Creek is degrading because sediment production has been practically stopped through the efforts of the Barber Creek Watershed Association. Further proof of degradation and of downstream transportation of sand along this creek is given by large sand bars built up along the lower portion of the stream, particularly at the Puritan Cordage Mill dam, which is located upstream from the Highway 129 and 441 bridge, approximately one-half mile upstream from the confluence of Barber Creek with the Middle Oconee River.

The sediment load from Barbar Creek combined with the existing sediment load from upstream degradation of the river may cause channel filling and subsequent swamping downstream along the river.

<u>Investigation Site 12</u>, Highway 11 and Middle Oconee River, Jackson County.

At this site, shown on Map 4, is a swamp along the Middle Oconee River which is over two miles long and as much as one-half mile wide. To either side of the natural levees of the river are well-formed lakes similar to Gunnin and Wingo Lakes described in Investigation Site number 6. Around the edge of the lakes are large stumps and trunks of dead trees. It was the opinion of the investigator that this swamp, like the others investigated, was a phenomena of post-European settlement. Especially conducive to this hypothesis is the fact that there was a milldam 2.7 miles downstream until 1918. (2.7 miles along the old meandering channel, 1.4 miles along the new straightened channel.) This milldam would have induced sedimentation upstream by raising the base level and creating a channel plug.

A search through the original Headright Grant plats at the Office of the Surveyor General, Georgia State Archives and Records, Atlanta, Georgia, did not result in finding a specific plat of this site, but among the many plats along the Middle Oconee River, not a single one carried the notation "wet" or "swampy." Many areas along the river were, however, marked as "lowland" or "cane break." Many of the trees (dogwood, post oak, pines) noted in these low areas were not types which normally grow in wet areas.[1]

A Jackson County, Georgia, warranty deed to this property, dated August 22, 1904, and giving a complete description of the property, was examined by the investigator.[2] Along with the deed was a map of the property (scale: 1 inch = 10 chains) dated April 4, 1888. Neither the deed nor the map made mention of any wet or swampy areas on the property.

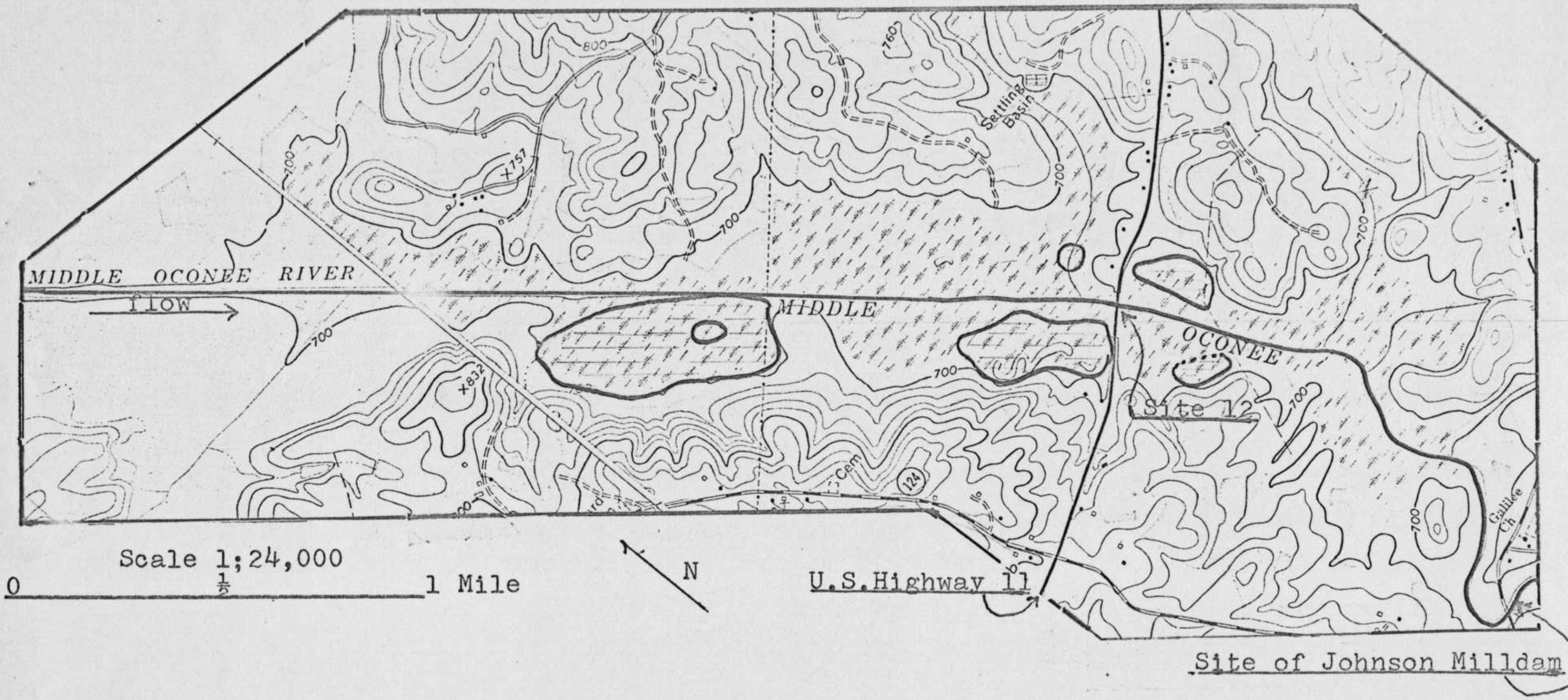
The 1891 USGS Topographic Sheet, Gainesville, Georgia, (Scale: 1:125,000) does not indicate any bog, swamp, marsh, or standing water along this stretch of river nor along any stream.

The 1914 Jackson County Soil Survey classified this area as Congaree silty clay loam which has already been described in (this thesis or page —) Investigation Site 6.

The following history has been constructed from information supplied by several of the local citizens. This area had been cultivated until after the turn of the century, but the stream channel filled with sediment from upstream row crop erosion, raising the ground water level, and the valley floor consequently became too wet to cultivate. ~~Also,~~ and the river began to flood more often. The millpond downstream and ~~upstream~~ wet areas upstream were known as a breeding ground for malarial mosquitoes. Because the channel meandered and constantly changed course, it was felt that a new, straight channel would increase the gradient and the resulting increased stream velocity would prevent sedimentation. Also included in this plan was the purchase and removal of the Johnson milldam downstream in order to lower the base level to the original elevation. This drainage endeavor, completed in 1918, was chartered and paid for by landowners having an interest in the affected area. Unfortunately, the sediment load entering the channel upstream could not be controlled,and the new channel soon filled with sediment. Also, canalizing the stream lowered the base level, probably causing degradation upstream. A large percentage of the sediment which soon refilled the new channel is probably

Investigation Site Twelve Showing Enlarged and

Recently Formed Lakes and Ponds



Base Maps: U.S. Geologic Survey Topographic Maps, Jefferson, Georgia, and Winder North, Georgia, 1:24,000, 1964.

Pond and lake data taken from USDA Aerial Photographs: ATN (Jackson County, Georgia) 3HH-162 and 163, January 29, 1967.

Map 4

therefore attributable to this upstream degradation. By 1925-28, the low land to either side of the stream flooded too often to be cultivated, but there was permanent standing water only in the segments portions of the old channel.[3]

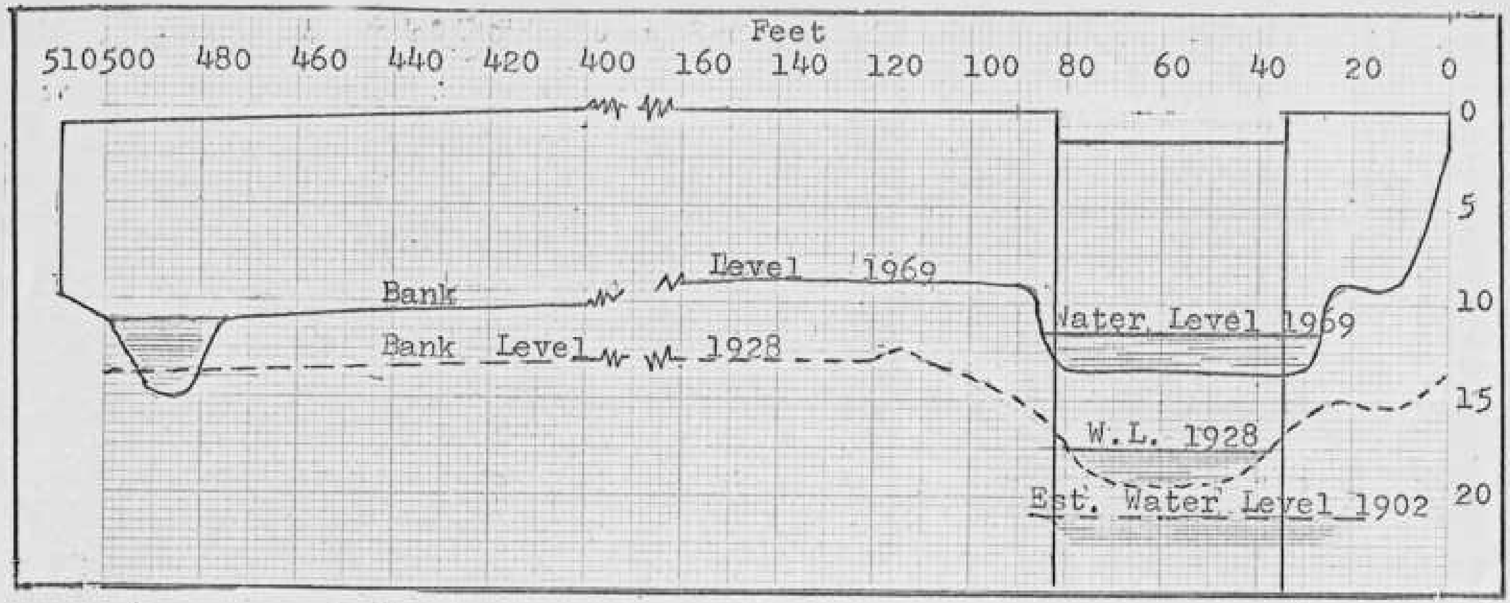
The new streambed was very unstable and fluctuated considerably in 1928.[4] The average stream level of 1928 was an approximate three to four foot increase from the estimated 1902 stream level as shown in Fig. 14. The stream has continued to aggrade since 1928 and at present (April, 1969) the stream level is six feet above that of 1928. This aggradation is corroborated by local residents who state that the swamps and lakes are becoming much more pronounced. The remains of large trees which have recently been killed, evidently by the rising water level, give mute testimony to the rising water level. Downstream 1.4 miles along the new channel, immediatly below the old millsite, there is now 13 feet of channel sediment covering the bedrock shoals over which the river flowed before 1918.

The present aggradation is largely because many tributaries such as Walnut Creek (see Investigation Site ~~xxxxxx~~ 13) are degrading, and the removed sediment is being deposited here in the main stream.

An aerial photography survey was made of the site using photos from 1944 to 1967, and the following information was obtained, which is noted on Map 4.[5] The water level has visibly risen, and other forest growth in the low areas has thinned, especially where water is now standing. A pond of seven to eight acres has formed since 1964 along the left bank downstream from the bridge. Another pond is beginning

Transverse Profile of Highway 11 Bridge over the

Middle Oconee River at Investigation Site 12



Vertical Scale: 1" = 10'
Horizontal Scale: 1" = 40'
Vert. Exaggeration: 4X
Bridge Plan: Winder-Jefferson Bridge over Oconee River, Jackson County, Project G-2-59, 1928

1902 Data: B.M. and M.R. Hall, Water Powers of Georgia, Georgia Geological Survey, Bulletin No. 16, (Atlanta: Franklin-Turner Co., 1908), p. 217.

to form downstream from the bridge along the right bank. The large pond along the right bank above the bridge has grown from just portions of the old stream channel to 18 to 19 acres. A two to three acre pond has formed along the left bank upstream from the bridge. A 45 acre lake has formed .8 mile upstream on the right bank. This area was still predominantly wooded in 1951. Several other newly formed or forming ponds appear on the 1967 photograph.

Conclusions:

This site, once excellent farmland, has become swamp in less than a century through the process of sedimentation. Because of the low gradient (four feet per mile) the stream at this site is still aggrading. Sediment material is being furnished by upstream tributaries which are degrading. The aggradation and consequent rising of the stream level is creating many ponds and lakes along both sides of the river.

[1] Headrights Plat Books A through ZZ, (land granted ca. 1783-1825), Office of the Surveyor General, Georgia State Records and Archives, Atlanta, Georgia.

[2] This deed and map are the property of Mr. C.T. Potter, Jackson County, Georgia, March, 1969.

[3] Interviews with Mr. Ed Kelley, Mr. Ed Davis, Mrs. A.D. Mize, and Mr. C.T. Potter, all of Jackson County, Georgia. All were interviewed in February and March, 1969.

[4] State Highway Department of Georgia, Winder-Jefferson Bridge Over Oconee River, Jackson County, Project G-2-59, 1928.

[5] USDA Aerial Photography, ATN (Jackson County, Georgia) -2C-43 and 44, April 5, 1944, ATN -2H-195 and 196, January 5, 1951, ATN-3HH-162 and 163, January 29, 1967.

Maddux Mill, Walnut Creek, Jackson County, Investigation Site No. 12 .

The ~~rock~~ stone dam, which was built on bedrock in 1910-1911, was 12 feet high and stood approximately 2 feet above the banks as shown in Fig. 12.[1] By 1915, the pond and stream below the dam had filled with sand and the turbines were no longer operable. The stream was also prone to flooding. By the 1930's, only ripples in the water marked the presence of the dam buried beneath the sand.[2] The exact level of the streambed during this period has not been ascertained. The dam remained thus buried until the late 50's or early 60's, and the stream has degraded itself approximately 3 feet since the dam reappeared. There has also been lateral cutting action which has been undermining the natural levees. This has caused trees to fall into the stream thereby slowing the degradation.

The stream flooded often while the streambed was at its highest, forming large natural levees. Note that there was lateral as well as vertical growth of the natural levees.

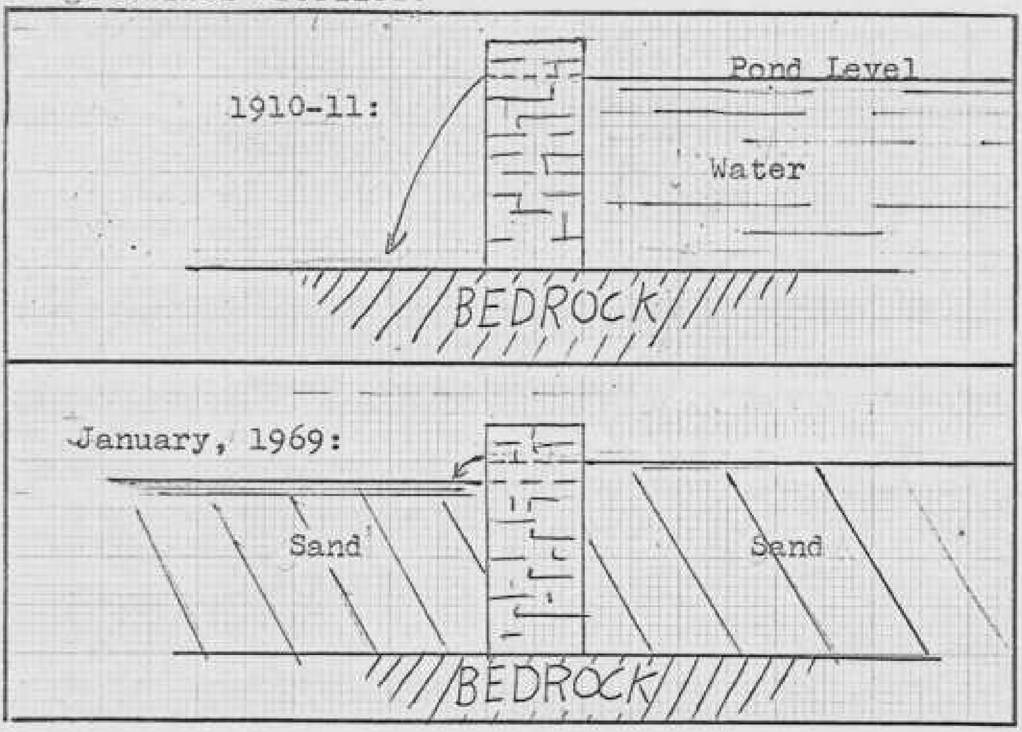
[1]Interview with Mr. Perry Maddux, Jackson County, Georgia, December, 1968. Mr. Maddux helped build the dam.

[2]Interview with Mr. Claude McKeever, Jackson County, Georgia, November, 1968.

Maddux Millsite

Vertical Scale: 1"=10', No horizontal Scale

Longitudinal Profiles:



Transverse Profile, Left Bank:

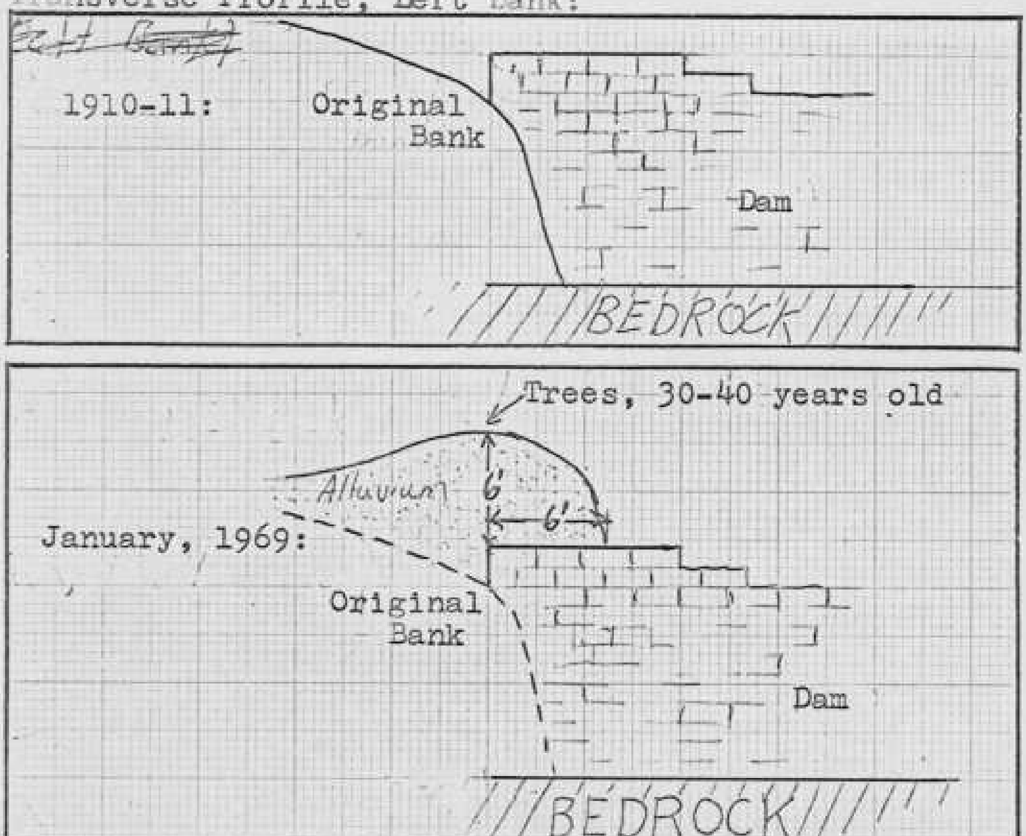


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Fig 15

North Oconee River

It is the investigator's opinion that the headwaters of the North Oconee River underwent less sedimentation than those of the Mulberry or Middle Oconee Rivers. As far as is known, only a short distance of the upper North Oconee was deepened and straightened. This straightened channel is in Hall County, just north of the Jackson-Hall County line. A tributary, Candler Creek, was also ditched.

In contrast to the headwaters of this stream, the section of river from Commerce, Georgia, to Athens underwent extensive sedimentation, such as at Investigation Site 14. Tributaries to this portion of river also underwent heavy sedimentation as shown at Sites 15, 16, 17, and 18. Popular opinion of local residents in this sedimented portion of the watershed holds that the milldam at Athens is responsible for the extensive upstream sedimentation. As noted in Site 14, there appears to be some basis in fact to this theory concerning streams immediately upstream from the milldam at Athens. It, however, appears unlikely that the channel plug at Athens could have induced deposition on Big Curry Creek as far upstream as Jefferson.[1]

---

[1]According to one source, the bursting of the milldam at Athens initiated degradation on Big Curry Creek at a point approximately four miles south of Jefferson. Despite the rebuilding of the dam, this degradation has continued until the present and the locus of degradation is moving upstream. Vertical degradation has amounted to approximately ten feet as of April, 1969. (Interview with Mr. Ed Davis, Jackson County, Georgia, April, 1969.)

Do you suppose that the original break in the dam created a change in surface equilibrium (e.g. temporary removal of vege or large boulders) so that degradation continued even after dam repaired?

‖ Denudn — SEE M.A. MELTON, "The Geomorphic & paleoclimatic significance of alluvial dep. in So. Ariz." Jour of Geol Vol 73 No 1 (1965) 1-38 — Especially p. 32 ff.

North Oconee River, Southwest of Commerce, Jackson County, Investigation Site No. 17 .

The valley floor at this site was once used for growing corn, but is now a wooded bog.[1] Approximately 75 years ago, the river ran in a deep canyon with near-vertical walls 18 feet high. The creek ran on bedrock and there was a shoals at the site.

By 1915-1918, the creek was filling with silt and sand, and the walls were approximately 14 feet high.

By 1937-38, the walls were 6 feet high. The WPA cleaned the logs, limbs, and other debris from the streambed and the level dropped 6-7 inches. The stream filled to its former level a year later , and sedimentation ~~resumed~~ has continued until, at present, the wall is 6 inches high as shown in Fig. 16, the stream having filled 1-2 feet in the past 20 years. The streambed level now appears to be static, and is again filled with logs, trees, limbs, and debris which would appear to be preventing degradation. The people in the area ~~once thought~~ think that the millpond at Athens (18-20 miles downstream) keeps the streambed level up, but ~~there~~ this has not been ascertained. ~~has been no change since said dam broke in June, 1967.~~

Transverse Stream Profile:

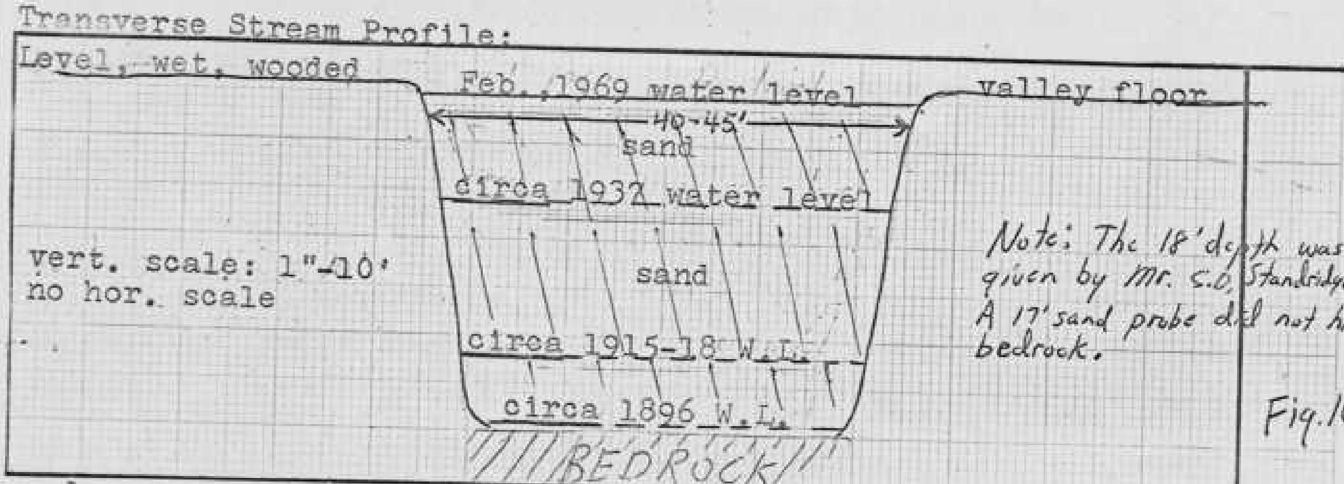


Fig. 16

[1] All information for this site was given by Mr. W. D. Standridge, Jackson County, Georgia, November, 1968, and February, 1969.

Stanley W. Trimble
Geog. Dept., U. of Ga.

Old Wool Factory Site, Borders Creek, Jackson County, Investigation Site No. 15 .

The stream at this site was flowing over bedrock shoals as late as 1918.[1] Most of the sedimentation took place before 1935; since that time it has filled approximately 3 feet, with only 1 foot having been added in the past 20 years. Natural levees are now 2 to 3 feet above the stream level which is approximately level with the valley floor. The streambed level now appears to be static. The streambed is now filled with logs, limbs, old tires, and other debris, and the stream will probably have difficulty degrading itself.

Several depth probes along 400 feet of the streambed gave varying depths indicating that the stream has made minor course changes in the process of sedimentation. A narrow valley at this point, however, held course changes to a minimum. Approximately one-half mile upstream is a large swamp caused by the ~~silting~~ sedimentation.

Transverse Stream Profile, December, 1968.

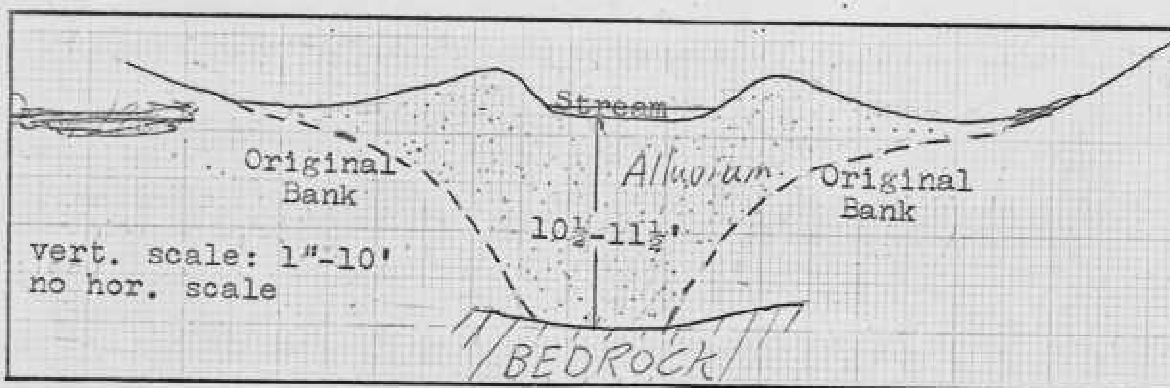


Fig. 17

[1]Interview with Mr. W. G. Davis, Jackson County, Georgia, December, 1968.

Williamson Millsite, Little Curry Creek, Jackson County, Investigation Site No. 16.

This mill ceased to operate circa 1904, but sedimentation ~~supposedly had no effect~~ ostensibly had no effect on its demise.[1] The ~~1915~~ Soil Survey of Jackson County, Georgia, surveyed in 1914, classified the bottom land soil along the creek at this site as "meadow."[2] "Meadow" soil was described as recent alluvium composed mainly of sand. Further:

> "It has been deposited since the upland soils have been cleared. . . . Some land which is now classed as Meadow (congaree material) was within comparatively recent years productive bottom land of a fine sandy loam or silty clay loam texture. Today these areas are practically worthless."[3] (emphasis the investigator's)

Notwithstanding the foregoing description, the large swampy area upstream from the bridge was open pasture as late as circa 1915, so sedimentation at this site apparently became acute at a later period.[4] As is apparent from the diagram, there has been extensive sedimentation. ~~apparently~~ Along the stream are well-formed, natural levees, two to three feet high. Behind the left bank levee is an extensive swampy area.

Insert Fig. 18

The streambed downstream from the bridge appears to be degrading slightly, the level having lowered four to six inches after the heavy rain in January, 1969. If the stream is, in fact, degrading, and if this degradation continues, there will probably be undermining of the bridge as at the Denham Millsite (Investigation Site 22).

---

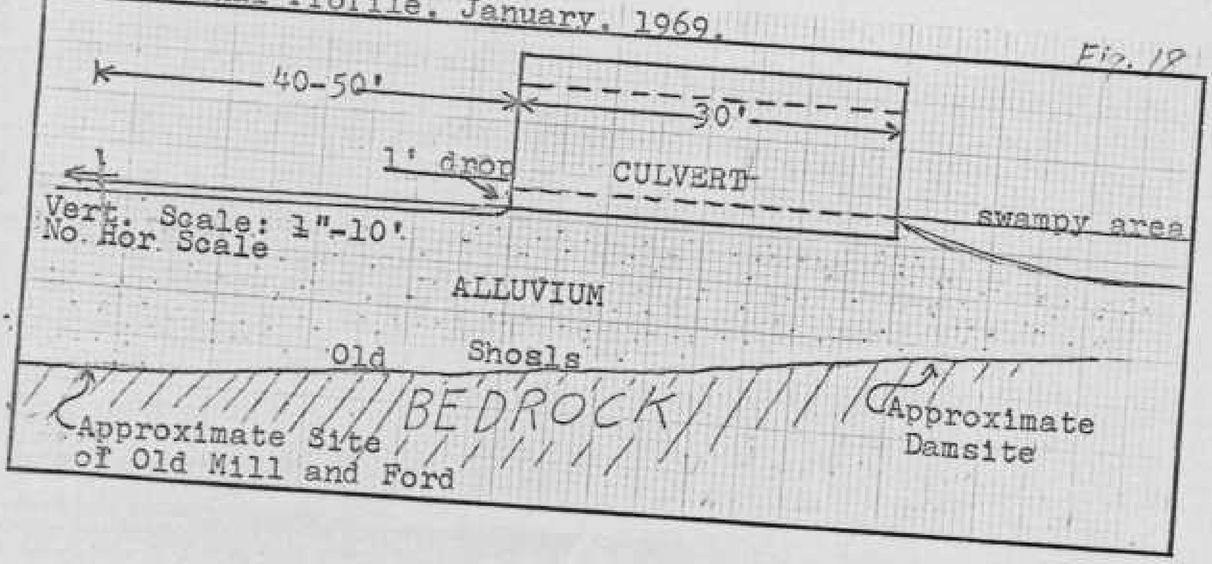
[1]Interview with Mr. Charlie Ware, Age 82, Athens, Georgia, 23 April 1969.

[2]Mark Baldwin and David D. Long, Soil Survey of Jackson County, Georgia, USDA, Bureau of Soils, (Washington, U.S. Government Printing Office, 1915), pp. 25-26.

[3] Ibid.

[4] Interview with Mr. W.D. Standridge, Jackson County, Georgia, November, 1968.

Longitudinal Profile, January, 1969.



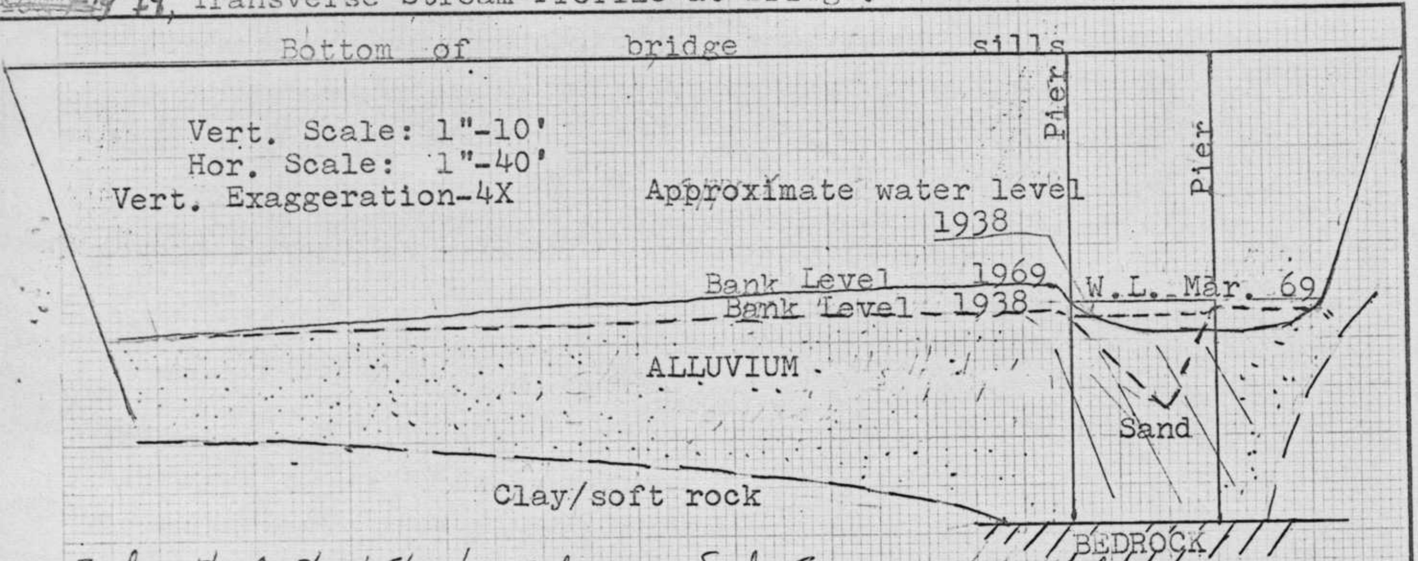
Investigation Site 17, Sandy Creek at Highway 441 Bridge, Clarke County.

No local resident contacted by the investigator concerning this Investigation Site could remember the area not being wet or swampy. However, After investigation of this area and in light of previous work done in this study, the investigator felt that this swampy area along Sandy Creek had developed since European settlement. This hypothesis was further strengthened by the knowledge that, since 1801, there has been a dam at Athens on the North Oconee River, only 2.2 miles downstream. This dam and the pond would have caused the sediment-laden stream to deposit its load, creating a channel plug with sedimentation progressively moving upstream.[1] Field observation at the Sandy Creek site revealed many large trees which, presently standing in water in the adjacent valley floor swamp, are now dead or dying. Along the stream, trees have their bases two to three feet below the surface of the stream. Many of these trees are also dead, and stumps can be seen below the stream surface.

A sand probe survey at the bridge site revealed that bedrock, clay, and soft rock were six to twelve feet below the surface as shown in Fig. 19. The depth of the bedrock beneath the surface of the stream increases toward the confluence with the North Oconee River at which point the depth to bedrock is 12 to 15 feet. The depth of the bedrock below the stream surface indicates that it is possible for the stream to have once flowed at a lower level than presently. Had this been the case, the water level in the valley floor swamp would possibly have been at a correspondingly lower level inasmuch as the ground water level close to a stream is partially regulated by the level of the stream.[2]

Insert Fig 19

Fig 19, Transverse Stream Profile at Bridge.



Bridge Plan: Plan + Elevation, Bridge over Sandy Cr.
Sta. 300+95 to Sta. 303+85, Clarke Co.,
S.A.P. 1502-A, July 1938, Scale 1"=10'.
State High. Dept. of Georgia, Bridge Department

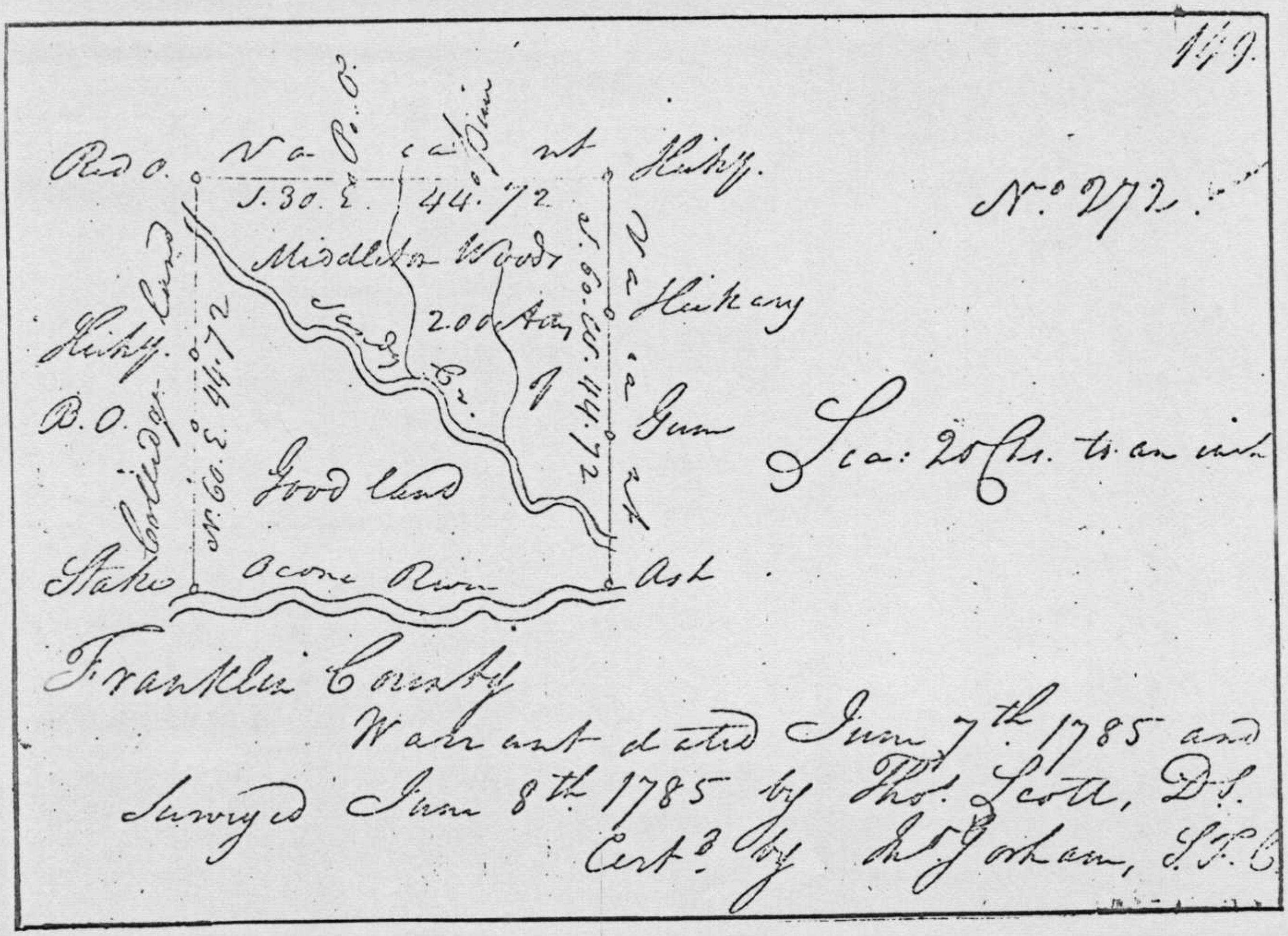
In order to test the hypothesis that this swamp has been formed since European settlement, the following information has been ascertained.

1. A check of the original Headrights Land Plats at the office of the Surveyor General, Georgia State Records and Archives, Atlanta, Georgia, was made by the investigator. After inspecting the land grant plats along the various branches of Sandy Creek, most of which were granted 1785-1790, only one spot was noted as "swamp" out of a total area of over 99,000 acres. Land plats in what appeared to be the lower portion of the drainage basin carried no "swamp" notation. A plat of the mouth of Sandy Creek, an area which is now quite swampy, carries the notation "good land."[3] This plat is shown in Fig. 20. The investigator acknowledges that there must have been some sedimentation taking place prior to European settlement. The name "Sandy Creek," which was in use by 1785, seems to be in indication of the type of sediment load carried by the creek in the pre-settlement era. The early erosion and consequent sediment load was possibly caused by Indian cultivation and from burned forest areas along the Creek.

2. A 1927 soil survey of Clarke County notes a swamp area five miles upstream from the mouth of Sandy Creek (downstream from Investigation Site No. 18), but the area of Sandy Creek in question is noted as Congaree silty clay loam which had these moisture characteristics: ". . . .The surface soil tends to remain wet for a considerable time after rains. The water table is in most places close to the surface." This was a soil with a definite profile, 30 to 40 inches deep.[4] A soil profile cannot be developed beneath the ground water level and this would seem to indicate that this valley floor area was at least 30 to 40 inches above ground water level for hundreds

Fig. 1.

Original Land Survey Plat of the Confluence of Sandy Creek with the North Oconee River, dated January 8, 1785



Source: Headrights Plat Book "N," p. 149, Office of the Surveyor General, Georgia State Records and Archives, Atlanta, Georgia.

Fig 2

of years and in fact, has been perennially submerged at this site only in the past 40 to 50 years. Thus, by 1927, it appears that ~~[illegible]~~ this soil was in a transition state from usually dry to perennially wet, ...

3. The Sandy Creek Watershed, although not one of the worst eroded areas of the state, did suffer much erosion. A Watershed Conservation Association, one of the first in the state, was formed in 1934 by the Soil Conservation Service to implement soil conservation measures. A survey of the Watershed in 1934 revealed that there had been extensive gullying, a type of erosion which is the most important contributor to stream sedimentation because of the heavy sediment materials involved.[5] One gully in particular was surveyed and is shown in ~~diagram~~ Fig. 21. The total of 37,700 cubic yards of ~~xxxx~~ subsoil materials eroded from 1909 to 1934 from this gully ~~alone~~ would be enough to fill a stream channel 21 feet wide and ~~3~~ three feet deep for a distance of over one mile. This gully, together with many others, would ~~xxxx~~ necessarily had to have caused much sedimentation in the Sandy Creek Watershed. This factor, together with the raised base level caused by the mill dam at Athens, would have caused the streambed to aggrade considerably; there is ~~no~~ little ~~other~~ alternative.

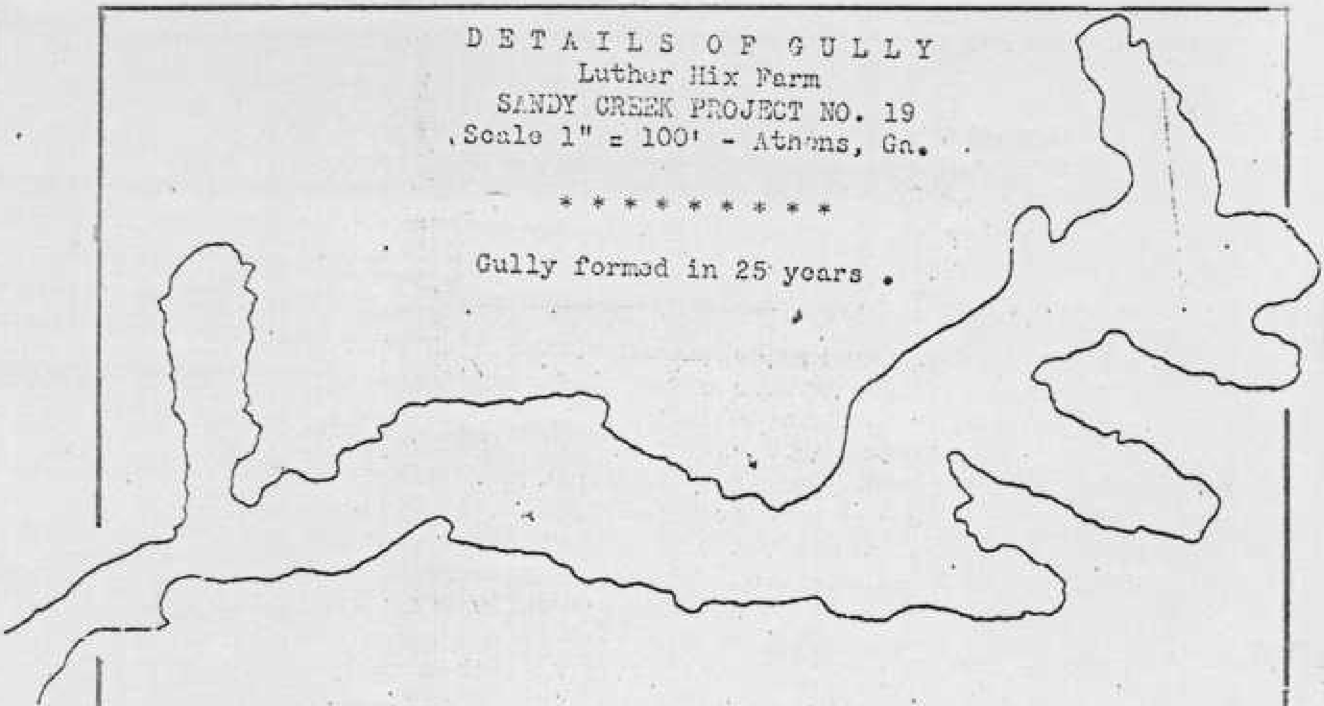
4. ~~The included Diagram~~ Fig. 19 shows a transverse stream profile at the Highway 441 Bridge ~~xx~~ site in 1969 as compared with 1938. Note that the natural levee has built up ~~to~~ from 1 to 1½ feet. The change in stream level was more difficult to ascertain because there is no stream discharge qualification given for the indicated 1938 stream level. Assuming that it was at normal flow, the stream level cannot have risen more than 6 inches. This figure seems low when one considers that the banks have aggraded one and one-~~xx~~ half feet. It is important to note that the Watershed Conservation Program had already been in progress for four years when the bridge

53

DETAILS OF GULLY
Luther Hix Farm
SANDY CREEK PROJECT NO. 19
Scale 1" = 100' - Athens, Ga.

* * * * * * * * * *

Gully formed in 25 years.



Total length of main gully	790 ft.
Average width of main gully at top	52 ft.
Average depth of main gully	26.6 ft.

LATERALS CAUSED BY IMPROPER TERRACE OUTLETS

Total length of five laterals	395 ft.
Average width of laterals	35 ft.
Average depth of laterals	29.5 ft.
Maximum depth of gully	42 ft.
Total volume of earth removed by the gully in 25 years. (Equal to 6" soil over 46.7 acres of land)	37,700 cu. yds.
Considering Cubic Yard of material as weighing 2,200 lbs.	
Total weight of soil removed	82,940,000 lbs.
Total weight of soil removed	41,470 tons
Average amount of soil removed per day for every day in 25 years	9,080 lbs.
Average amount of soil removed per day for every day in 25 years	4.54 tons
Actual area covered by gully	1.6 Acres
Area now rendered worthless for crop growing	2.5 Acres

Source: Sandy Creek News, Vol. #1, (November, 1934).

Fig. 21

was built in 1938. The amount of erosion and consequent sedimentation should therefore have been waning even before ~~xx~~ the bridge was built. Had there been a stream and bank level index available from the early 1900's, the indicated aggradation would probably have been much more significant.

According to a local knowledgeable resident, the level of both Sandy Creek and the North Oconee River have been rising in recent years. Several areas which are presently permanently or semi-permanently inundated were fairly dry 12-15 years ago. In addition, the river has changed channels directly upstream from the mouth of Sandy Creek. Several quxillary channels have been formed which carry much of the flow during floods.[6]

Conclusions: See next page

[1]Happ, et al, "Some Principles of Accelerated Stream Sedimentation" USDA Technical Bulletin No. 695, 1940. p. 75.

[2]Ibid. p. 70.

[3]Headrights Plat Book "N", p. 149, Office of the Surveyor General, Georgia State Records and Archives, Atlanta, Georgia.

[4]G. L. Fuller, Soil Survey of Clarke County, USDA, Bureau of Chemistry and Soils, 1927.

[5]Happ, et al, p. 87 and 95.

[6]Interview with Mr. Dewey Sorrow, Clark County, Georgia, 26 April, 1969. Meander scars from the noted channel changes were noted on the USDA Aerial photographs: ATG (Clarke County, Georgia) -5HH-136 and 137, March 1, 1967.

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Conclusions: It is the investigator's opinion that the wet, swampy area between the Highway 441 bridge and the mouth of Sandy Creek was low, fertile, tillable, and relatively dry land before European settlement, inundated perhaps only during ~~[illegible]~~ floods. The combination of accelerated erosion and the raised base level at the mouth of the creek caused sedimentation to a point whereby the stream level and consequent ground water level were raised above ground level. The result has been perennial surface water to either side of the main stream so that a swamp ecology has developed in the past 50 to 100 years.

Investigation Site 18, Sandy Creek at the Old Wages Millsite, Jackson County, Søx Miles Upstream from the Mouth of Sandy Creek, Two Miles Southeast of Center, Georgia.

In 1908, Sandy Creek still flowed over bedrock shoals at this site, and the creek was forded across bedrock.[1] At that time, a swampy area began approximately one-half mile downstream at about the Clarke-Jackson County line, and there were a few small swampy areas along the creek upstream from the shoals. The creek was carrying a large sediment load at this time, especially during times of high water. By 1930, the shoals were completely covered with sand to a depth of two to five feet.[2] In January, 1969, the depth of sand over the old fording site was 12 feet, and there are now swamps to either side of the stream. Approximately 1½ miles downstream, land that was cultivated 50 to 60 years ago is now swamp. The water and muck are now six to eight feet deep.

Most of the sedimentation at this site is fairly recent and is from upstream degradation caused by changing land use, implemented conservation measures, and stream disequilibrium. This removed sediment is transported as far as the channel plug (the swampy area) and is redeposited. Thus, aggradation should continue at this study site for some time to come.

[1]Interview with Mr. H. R. Wilkes, Athens, Georgia, March 8, 1969.

[2]Interview with Mr. C. L. Brooks, Center, Jackson County, Georgia, April 26, 1969.

The Appalachee River

The movement of sand as sediment load on the Appalachee River was noted as early as 1883.[1]

With the possible exception of Little River, the Appalachee is a more youthful appearing stream than others in the Study Area. There is relatively less river bottom development; consequently, a given rise in the water level floods less area than along, for example, the Middle Oconee River, which appears to have more bottom land development. Further, the gradient of the Appalachee is greater than other major streams in the study area.[2] Like the other streams, it is a series of alternating rapids and pools. Most of the rapids have had a sufficient velocity to prevent deposition, except, in some cases, at the lower end of the shoals such as at Investigation Site 19. In a few isolated cases, there is swamp development along the river in pool areas ~~where there was~~ of bottom land development. An example of this is an extensive area downstream from the point where Walton, Barrow, and Oconee Counties join.[3] This area extends downstream from the mouth of Marbury Creek, long noted for its sediment load. Unfortunately, there was no site suitable for documentation along this section of river.

The tributaries of the Appalachee also have extensive rapids, but many also have extended low-gradient sections with broad, low, bottom lands. Many of these low-gradient sections filled with sediment, flooding ~~low~~ the bottom lands and producing swamps. Tributaries which have suffered heavy sedimentation damage are Jack's Creek and Shoals Creek in Walton County, Big Sandy and Hard Labor Creeks in Morgan County, and as already noted, Marbury Creek in Barrow County. Two of these swamps are investigated in Investigation Site 20 and 21.

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[1] "Reports on Water Power of the United States," Part One, Tenth United States Census, (Washington: Government Printing Office, 1885), p. 149.

[2] Altamaha, Oconee, and Ocmulgee Rivers, Georgia, U.S. Corps of Engineers, House Document No. 68, 74th Congress, 1st Session, (Washington: U.S. Printing Office, 1935), Plates 5 and 6. United States Geologic Survey Topographic Maps: Jefferson, Georgia; Winder North, Georgia; Auburn, Georgia. Scale: 1:24,000, 1964.

[3] Soil Survey of Clarke and Oconee Counties, Georgia, USDA, Soil Conservation Service, (Washington: U.S. Government Printing Office, November, 1968), Map sheet 18.

Soil Survey of Walton County, Georgia, USDA, Soil Conservation Service, (Washington: U.S. Government Printing Office, December, 1964), Map sheet 4.

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Head's Millsite, Appalachee River, Oconee-Morgan Counties. Investigation Site No. 19.

Accumulation of sand was evident at this millsite as early as 1886.[1] The mill and dam washed away in a flood circa 1900, but bedrock was still visible below the dam before the dam broke.[2] A survey of the river in 1902 noted that the iron bridge piers on the right bank were 23 feet above the surface of the water.[3] On 29 April 1969, the water level at normal flow was 15 feet below the top of the piers. The difference in the two measurements would indicate an aggradation of eight feet since 1902. This figure appears to be corroborated by the fact that the present (April, 1969) water level is 9 to 13 feet above bedrock. There is presently no trace of the shoals which existed at this site.

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[1] "Reports on Water Power of the United States," Part One, Tenth United States Census, Washington: Government Printing Office, 1885, p. 149.

[2] Interviews with Mr. C.O. Bishop ~~(age 76)~~, Madison, Georgia, 29 April, 1969, and Mr. A.B. Beal, Morgan County, Georgia, November, 1968 and 29 April 1969.

[3] B.M. and M.R. Hall, "Water Powers . . . ." p. 218.

Big Sandy Creek and U.S. Highway 441, Morgan County, Investigation Site 20.

There is a swamp area along this portion of Big Sandy Creek which covers several thousand areas and is up to one mile wide.[1] At the investigation site, the swamp is approximately 3/4 mile wide. Preliminary investigation in March, 1969, revealed the stumps and trunks of many dead trees and several stumps could be seen with bases two to three feet below the surface of the stream. Recent sediment deposition was evident on the slight natural levees along the stream. Several changes of stream channel were also evident. Based on previous investigations, especially Investigation Sites 12 and 17, it was the investigator's opinion that this swamp was a phenomena of post-European settlement. In order to test this hypothesis, the following information has been ascertained:

1. The entire lengths of Big Sandy Creek and Little Sandy Creek have been inspected on the original land plats which were surveyed in 1804. There is no notation which would indicate wet or swampy lands along these streams with the exception of a pond noted upstream from the study area.[2]

2. Although there has been swamp along this stream during the life time of local residents, much of the lowlands now in swamp were cultivated in crops until *circa* 1895 and in hay until *circa* 1910. Ditching, however, was needed at that time to keep these lowland soils dry enough to raise crops.[3] The area of swamp has increased noticeably in the past 60 years.[4]

3. The soil along Big Sandy Creek which is now swamp land was classified in 1919 as Congaree silty clay loam. This soil was

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described as occupying

> "low, flat areas along stream courses and is subject to overflow with comparatively slight rise of the stream level. In many places the water remains on the surface for a considerable length of time, as the run-off is not rapid. By straightening and deepening the stream channels, the drainage of this type could be materially improved.. . . About 40 per cent of the type in Morgan County is cleared."[5]

4. Fig. ~~Diagram~~ 22 is a transverse stream profile at the bridge. The stream level was raised two feet between 1931 and 1969 and the banks alongside the stream aggraded 1½ to 2 feet. The valley floor at some distance from the stream has aggraded very little and the water level in the swamp, which has been raised with the stream level, is now high enough to permanently cover large portions of the valley floor. Because large portions of this inundated area are only 6 inches to 1 foot deep, it is the investigator's opinion that these areas have flooded since 1931. This opinion is possibly corroborated by the presence of many dead trees which were apparently killed by the rising water level.

Conclusions: All examined evidence seems to indicate that this swamp has formed since the area was settled in the early 1800's. The present aggradation should be expected because a large proportion of the land five to ten miles upstream ~~on the headwaters of this stream~~ is being planted to row crops and much erosion is still in process.[6]

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[1] Soil Survey of Morgan County, Georgia, USDA Soil Conservation Service, (Washington: U.S. Government Printing Office, September, 1965), Map Sheet 13.

[2] Landlot Book EE, Baldwin County, District 5, Plat Numbers 168, 167, 166, 165, 164, 144, 145, 162, 161, 160, 159, 150 (Big Sandy Creek), 123, 122, 121, 120, and 119 Little Sandy Creek). Office of the Surveyor General, Georgia State Records and Archives, Atlanta, Georgia.

[3] Interview with Mr. A. B. Beal, (Age 88) Morgan County, Georgia, 29 April 1969.

[4] Interview with Mr. C.O. Bishop, (Age 76) Madison, Georgia, 29 April 1969.

[5] David D. Long, etal, Soil Survey of Oconee, Morgan, Greene,

Big Sandy Creek at the U.S. Highway 441-129 Bridge

Transverse Stream Profile

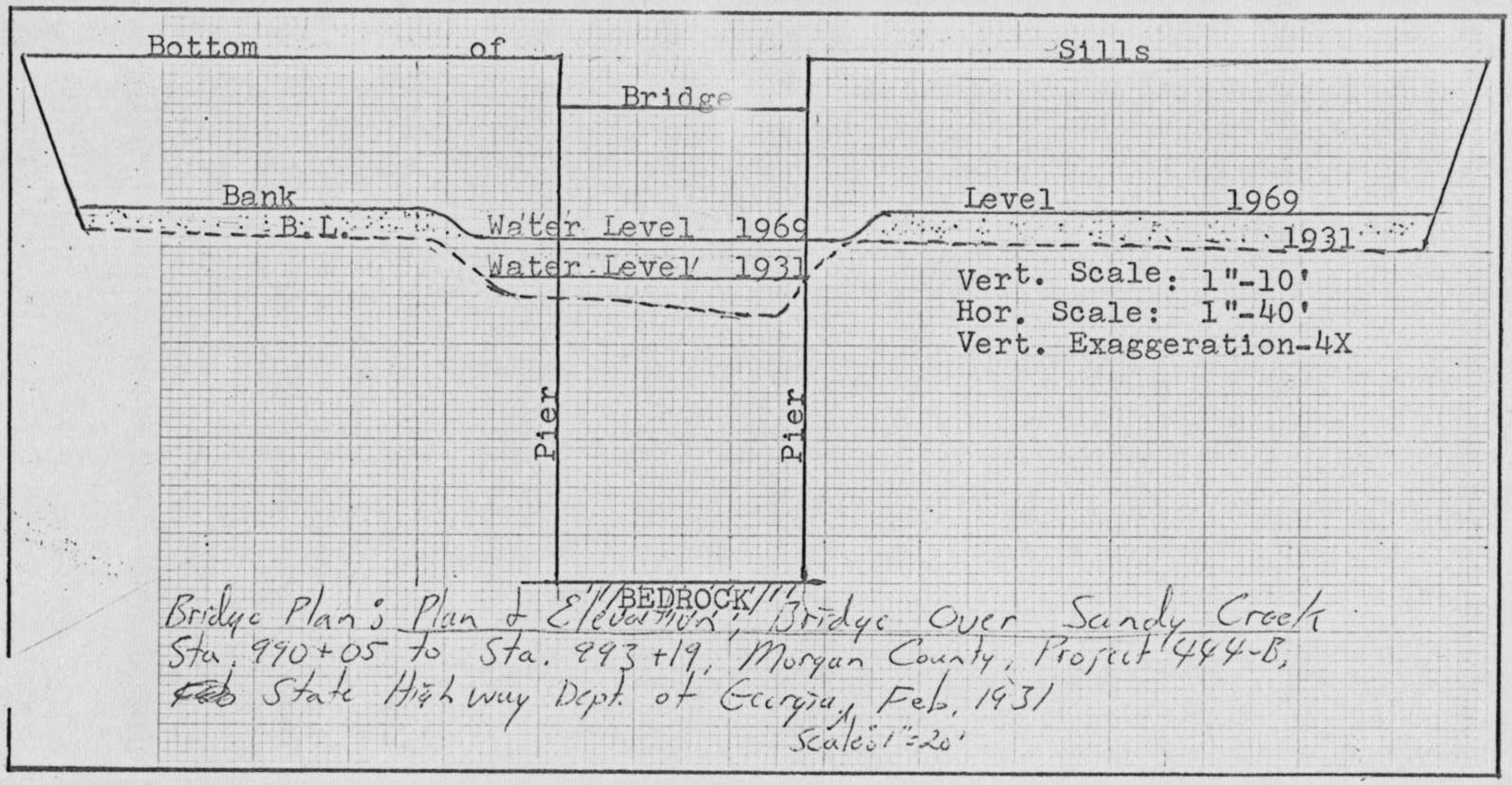

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Fig 22

and Putnam Counties, Georgia, USDA, Bureau of Soils, (Washington: Government Printing Office, 1922), pp. 56-57.

[6]Interview with Mr. Sidney L. Mullis, Morgan County Soil Conservation Agent, Madison, Georgia, 21 March, 1969.

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Hard Labor Creek and U.S. Highway 441, Morgan County, Investigation Site No. 21.

This site is very similar to Big Sandy Creek, Investigation Site No. 20, except that the swamp characteristics are much less pronounced. The same sources consulted in the investigation of Big Sandy Creek were used for this site, and development of the two areas was very similar until the 1930's.[1]

~~Diagram~~ Fig 23 shows that although the stream banks have aggraded somewhat since 1931, the stream level has lowered approximately one foot during the same period. Big Sandy Creek at Site 20, only 2½ miles to the north, aggraded 2 feet during the same period of time. Inasmuch as the two streams flow parallel to one another and, in fact, join before flowing into the Appalachee River, an attempt was made to analyze the variation in processes of the two streams. The causes of variation are:

1. A large percentage of the upstream area of Big Sandy Creek is planted to row crops and much erosion is still in progress. Although there is some upstream row cropping in the Hard Labor Creek watershed, a large portion of the land is in the Hard Labor Creek State Park and is under forest cover.[2]

2. Two large lakes have been impounded on Hard Labor Creek. Because these lakes entrap most sediment load, especially bedload, and increase the competence of the effluents, the downstream channel should have a tendency to degrade.[3]

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[1]Hard Labor Creek may be traced on the following land plats: Landlot Book EE, Baldwin County, District 5, plats 175, 215, 176, 177, 169, 141, 127, 110, 92, 82, 83, and 62. Landlot Book RR, Baldwin County, District 20, plats 242, 213, 207, and 206.

[2]Luna B. Leopold, "Land Use and Sediment Yield," in William L. Thomas, Jr., (ed.) Man's Role in Changing the Face of the Earth, (Chicago: University of Chicago Press, 1956), p. 646.

2. Interview with Mr. Joe Stephens, Soil Conservation Service Drainage Engineer and Chief of the Big Sandy and Hard

Hard Labor Creek at the U.S. Highway 441-129 Bridge

Vertical Scale: 1" = 10', Horizontal Scale: 1" = 40'

Vertical Exaggeration = 4X
Transverse Stream Profile

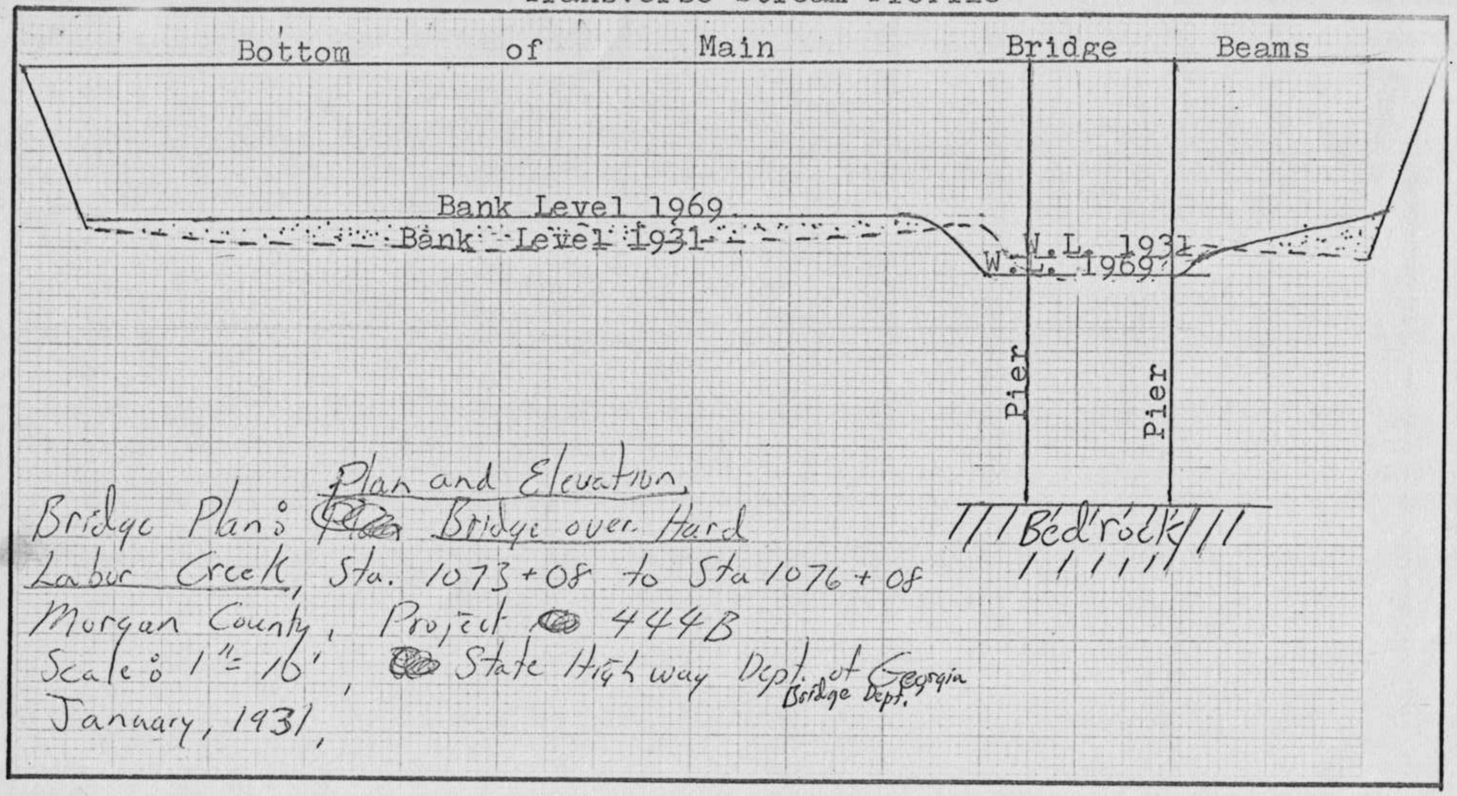

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Fig. 23

Little River

In general, the Little River Watershed underwent less sedimentation than the four previously discussed watersheds in the northern portion of the Study Area. Apparently, the Putnam, Baldwin, and Jones County portions of this watershed suffered relatively little sediment damage.[1] The Morgan County portion was visibly affected, particularly along Big Indian and Little Indian Creeks.[2] Jasper County had, by far, the most damage from accelerated sedimentation. Sedimentation and resultant swamping was especially evident along Murder, Cedar, Gap, Wolf, and White Oak Creeks. There was some local sedimentation damage at locations along Little River, but this damage was areally insignificant. Unfortunately, no suitable Investigation Sites were found in this watershed, the lower portion of which is inundated by Lake Sinclair. The absence of Investigation Sites in this watershed does not indicate that culturally accelerated sedimentation was insignificant.

[1]This conclusion was corroborated by W.S. Carson, Soil Scientist, Soil Conservation Service, Milledgeville, Georgia.

[2]This area was affected as early as the 1890's. The USGS Topographic Map Monroe, Georgia, 1894, 1:125,000, indicates several wet spots along these streams.

The Remainder of the Study Area

The remainder of the Study Area, located in the southwest portion, underwent less sedimentation than the portions already discussed. There were, however, many areas of intense local sedimentation such as ~~Sandy~~ Shoals Creek in Clarke County, Barrow and Big Creeks in Oglethorpe County, Fishing and Richland Creeks in Green County, Greenbriar and Rose Creeks in Oconee County, Rooty and Crooked Creeks in Putnam County, and Fishing + Champion Creeks in Baldwin County.[1] Only one suitable Investigation Site, on Crooked Creek in Putnam County, was found.

[1]Rose Creek and the Oconee River at the junction of the two streams were heavily sedimented as early as 1885. (E. Merton Coulter, "Scull Shoals: An Extinct Georgia Manufacturing and Farming Community," in E. Merton Coulter, Georgia Waters, (Athens: Georgia Historical Quarterly, 1965), pp. 101-102.

For a special report concerning the deepening and straightening of Rose Creek, see H.H. Barrow and J.V. Phillips, Agricultural Drainage in Georgia, Geological Survey of Georgia, Bulletin No. 52, (Atlanta: Byrd Printing Co., 1917), pp. 30-32 plus one map.

Denham's Mill, Crooked Creek, State Highway 44, Putnam County, Investigation Site No. 22.

The creek was flowing on bedrock upstream from the bridge site as late as 1880.[1] There has been sedimentation of the stream channel since circa 1915 or before.[2] The bridge was built 1944-1945. At that time, the streambed (sand) was flush with the sills of the bridge, both above and below the bridge. The stream level below the bridge (which acts as a dam) has degraded 3 feet in the past 24 to 25 years; however, most of the degradation has taken place within the past few years. The bridge is being undermined at the downstream end, and it is possible that the stream will flow under the bridge sills in the near future unless some action is taken. The creek should not lower itself considerably directly below the bridge because of rubble and stones in the streambed .

Longitudinal Stream Section at Bridge.

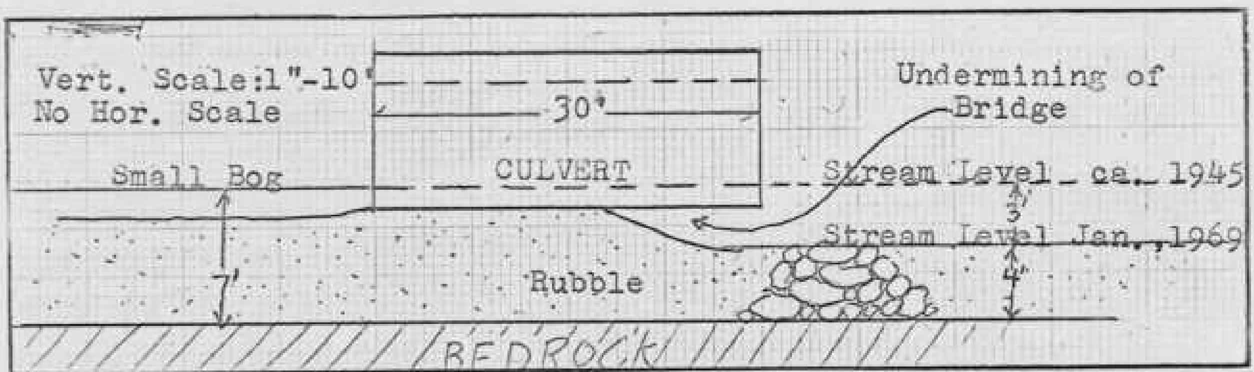

Fig. 24

[1]The fact that the creek was flowing over bedrock in 1880 was determined in the following manner: The 1880 Census of Manufactures (Manuscript) for Putnam County, Georgia, lists Denham's Mill as having a head of 20 feet. The end of the old race is now 13 feet above the present stream level which, in turn, is 7 feet above bedrock as shown in the sketch. Therefore, the stream had to flow on bedrock in order to give the specified 20 foot head.

[2]Interview with Mr. G. R. Smith, Putnam County, Georgia, January, 1969.